"A STUDY OF DIAGNOSTIC LAPAROSCOPY IN THE EVALUATION OF RIGHT LOWER ABDOMINAL PAIN"

Dissertation submitted
To
THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI

With partial fulfillment of the regulations for the award of the degree of

M.S (General Surgery)
Branch-I

Government Kilpauk Medical College
Chennai

April -2014

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation titled **"A study of diagnostic laparoscopy in the evaluation of right lower abdominal pain"** is a bonafide and genuine research work carried out by me under the guidance of **Prof. USHA DORAIRAJAN MS, FRCS,** Department of General Surgery, Kilpauk Medical College, Chennai -10.

This dissertation is submitted to **THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY CHENNAI** in partial fulfillment of the university regulations for the award of MS degree (General Surgery), General Surgery examination to be held in **April 2014**.

Date:
Place: **Dr. P.S.ARUN**

CERTIFICATE

This is to certify that this dissertation is the bonafide work of

Dr. P.S.ARUN

On

"A STUDY OF DIAGNOSTIC LAPAROSCOPY IN THE EVALUATION OF RIGHT LOWER ABDOMINAL PAIN"

during his course in M.S. General Surgery from November 2012 to November 2013 at Government Kilpauk Medical College, Chennai-10.

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This is to certify that the dissertation titled "**A study of diagnostic laparoscopy in the evaluation of right lower abdominal pain"** is a bonafide research work done by **Dr. P.S.ARUN**, post graduate student in M.S. General Surgery, Kilpauk Medical College, Chennai - 10 under my direct guidance and supervision to my satisfaction, in partial fulfillment of the requirements for the degree of **M.S. General Surgery**.

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ACKNOWLEDGEMENT

I would like to thank God for the things he has bestowed upon me. I thank each and every person involved in making this manuscript from inception to publication.

I am most thankful to **PROF. P.RAMAKRISHNAN MD, DLO, Dean, Kilpauk Medical College and Hospital** for the opportunity to conduct this study in the Department of General Surgery, Kilpauk Medical College and Hospital, Government Royapettah Hospital, Kilpauk Medical College, Chennai-10.

I wish to express my heartfelt thanks to **PROF. P.N.SHANMUGASUNDARAM MS.,** Professor and Head of the Department of Surgery, for having helped me at every step in successfully completing the study.

I wish to express my deepest gratitude to my guide and mentor **PROF. USHA DORAIRAJAN MS, FRCS.,** Chief of Surgical Unit II, Department of General Surgery, Kilpauk Medical College, who has inspired me immeasurably during my training as a post Department of General Surgery for the encouragement and unrestricted permission to use the Department of General Surgery.

My special thanks to **Prof. O.L.Naganath Babu,** Professor of Surgical Gastroenterology, Kilpauk Medical College, **Prof.Sugumar**, Professor of Surgical Gastroenterology, Kilpauk Medical College, for guiding me through this study and his unrestricted permission to use their department for the study.

I acknowledge the invaluable advice and counseling received from my Assistant Professors, **Dr.V.Vijayalakshmi MS, Dr.N.B.Thanmaran MS** and **Dr.A.K.Kalpanadevi MS**.

This study would have not been possible without the support of my fellow post graduates and interns who have been a source of help in need.

The most important part of any medical research is patients. I owe a great deal of gratitude to each and every one of them.

A STUDY OF DIAGNOSTIC LAPAROSCOPY IN THE EVALUATION OF RIGHT LOWER ABDOMINAL PAIN

Contents

Diagnostic laparoscopy in the evaluation of right lower abdominal pain

Abstract

Introduction

Right lower quadrant pain in abdomen is the most common type of acute abdominal pain and often presents a diagnostic challenge to the surgeon. There are numerous differential diagnoses for this symptom which can present in various ways. The systematic use of laparoscopy especially in cases of diagnostic dilemmas is a very valuable tool to arrive at the proper diagnosis as well to plan the treatment.

Objectives

The aims of this prospective study are to define the role of diagnostic laparoscopy in evaluating right lower abdominal pain and to study the incidence of different conditions causing right lower quadrant pain using diagnostic laparoscopy.

Methodology

In this prospective study 72 patients with right lower abdominal pain admitted to the Emergency Department and undergone diagnostic laparoscopy were evaluated.

Results

The abnormal findings noted include appendicitis, adhesions, adnexitis, mesenteric lymphadenitis, meckel's diverticulitis, mesenteric panniculitis, hydrosalpinx and right adnexal cyst. The most common finding is appendicitis (75%). Females (67%) are commonly affected by adhesions. Females with RLQ pain were found to have more number of non gynaecological findings (85%) than gynaecological ones. About 85 percent of the patients with RLQ pain had a benefit of undergoing extended therapeutic and ancillary procedures.

Conclusion

Laparoscopy provided its diagnostic benefit in ninety one percent of patients, who presented with right lower abdominal pain. It yielded its maximum diagnostic gain in women of child bearing age group. In these patients, the exposure to radiation by subjecting them to unnecessary radiological investigation is minimized. It had a therapeutic role in eighty percent of the patients with right lower quadrant pain.

Keywords

Diagnostic laparoscopy, right lower quadrant pain, appendicitis, adhesions, gynaecological causes

INTRODUCTION

INTRODUCTION

Evolution of surgical instrumentation and technique has resulted in a valuable instrument called laparoscope.

Diagnostic laparoscopy is of tremendous help in a patient with uncertain abdominal pathology. The appropriate implementation of diagnostic laparoscopy often helps to avoid expensive diagnostic studies and more importantly unnecessary laparotomy.

It is indicated if neither laboratory findings nor modern imaging techniques provide a clear diagnosis or if the use of imaging techniques is impossible because of logistic reasons or if the necessary time is not available.

Right lower quadrant pain in abdomen is the most common type of acute abdominal pain[1] and often presents a diagnostic challenge to the surgeon. Patients with right lower quadrant pain often come to medical attention during off hours and hence require an efficient and goal directed diagnostic assessment to receive the necessary treatment as early as possible. The assessment must often be carried out at times when the availability of ancillary testing is limited.

There are numerous differential diagnoses for this symptom which can present in various ways. Acute appendicitis and diseases of female genital tract are the most frequent causes implicated[2]. The systematic use of laparoscopy especially in cases of diagnostic dilemmas is a very valuable tool to arrive at the proper diagnosis as well to plan the treatment.

AIMS AND OBJECTIVES

AIMS AND OBJECTIVES

This study was conducted in Government Kilpauk Medical College Hospital, Kilpauk during the period of October 2012 to November 2013

Study group comprised of patients who had undergone Diagnostic Laparoscopy for right lower abdominal pain.

The aims of this prospective study are

- To define the role of diagnostic laparoscopy in evaluating right lower abdominal pain
- To study the incidence of different conditions causing right lower quadrant pain using diagnostic laparoscopy

REVIEW OF LITERATURE

RIGHT LOWER QUADRANT PAIN

RELAVANT ANATOMY

The pain in the right lower quadrant (RLQ) is usually due to the pathological conditions associated with the following organs which are normally located in RLQ.

In males:

1. Caecum
2. Vermiform appendix
3. Terminal ileum
4. Mesentery containing blood vessels and lymph nodes
5. Right ureter

In females:

1. Caecum
2. Vermiform appendix
3. Terminal ileum
4. Mesentery containing blood vessels and lymph nodes
5. Right ureter
6. Right ovary
7. Right fallopian tube

Diagnosing RLQ pain can be quite difficult in the sense that myriad of reasons are associated with such pain. It can range from a negligible muscular inflammation or an infection in any of the RLQ organs to major ailment or disease that has life threatening implications. Therefore it is important to make a proper diagnosis.

The diagnostic evaluation of RLQ pain is challenging, not just because of wide variety of causes but also because the leading differential diagnoses are very much different depending on age and sex of the patient. The most frequent conditions encountered are acute appendicitis or female genital diseases.

Gastroenterological causes

- Acute appendicitis
- Adhesions
- Mesenteric lymphadenitis
- Ileocaecal tuberculosis
- Meckel's diverticulitis
- Mesenteric panniculitis
- Inflammatory bowel diseases
- Carcinoma caecum

- Gastroenteritis
- Infected or perforated caecal pole diverticulum

Gynaecological causes

- Adnexitis and tubo-ovarian abscess
- Torsion of ovarian cyst
- Ectopic pregnancy

Urological causes

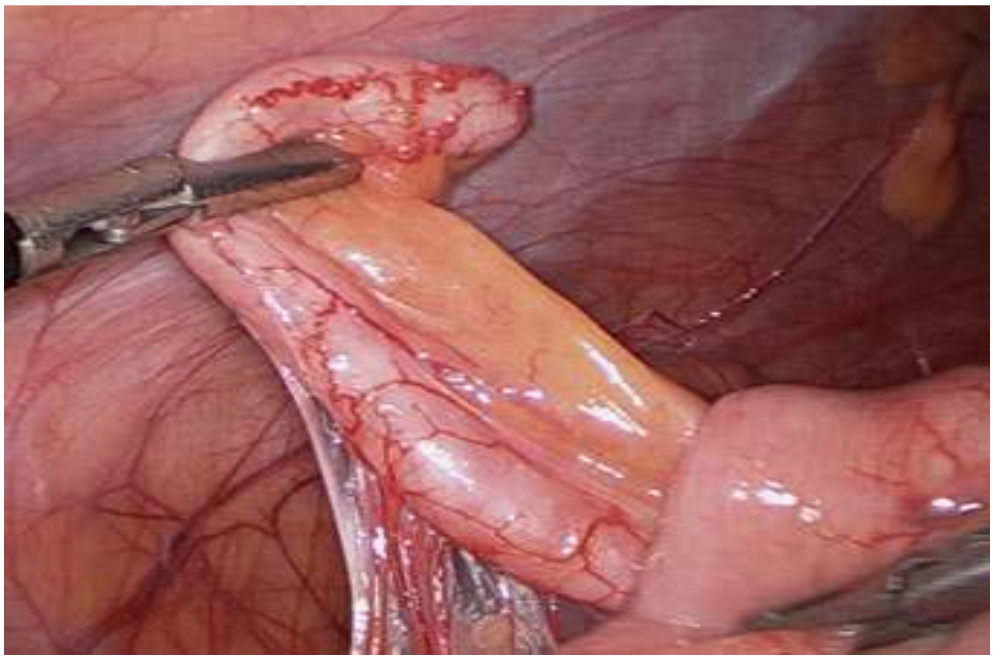
- Urolithiasis
- Cystitis / pyelonephritis
- Tumours of urinary tract

Neurological or orthopedic causes

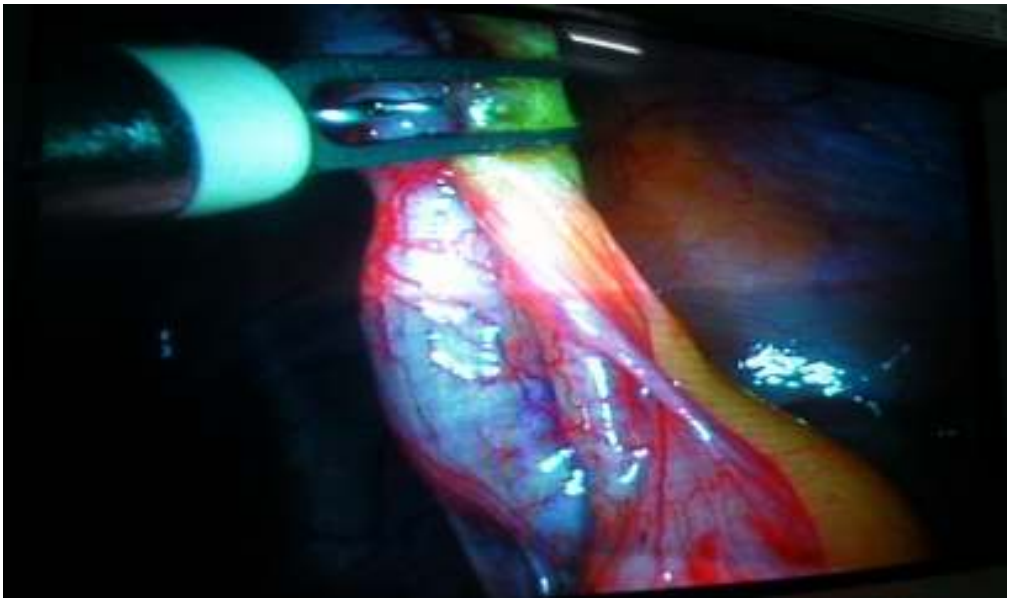
- Radicular / pseudoradicular pain
- Cox arthrosis
- Sacroileitis
- Herpes zoster

Acute appendicitis is the most common acute surgical condition of the abdomen[3]. It may occur at all ages but it is frequently seen in second or third decades especially in teen aged girls. Obstruction of the lumen is believed to be the important cause of acute appendicitis. This may be due to inspissated stool (fecolith or appendicolith), lymphoid hyperplasia, vegetable matter, parasites, or a neoplasm.

Initially the pain is diffuse and dull typically and gradually after 1 to 12 hours pain is localized in the right lower quadrant. Variation in anatomical position of the appendix will account for variation of the principal site of the pain. Other classical symptoms include anorexia, nausea, and vomiting and low grade fever.



Appendicitis



Appendicitis with adhesions

Abdominal examination usually reveals focal tenderness at the McBurney's point. The progress of peritoneal irritation may present as voluntary and involuntary guarding, percussion or rebound tenderness.

An elevated leucocyte count with more than 75% neutrophils is present in 90% of the patients. A high WBC count of more than 20,000 / mL suggests complicated appendicitis with gangrene or perforation.

Among patients with RLQ pain, USG has a sensitivity of 85% and a specificity of more than 90 percent.

Sonographic findings consistent with appendicitis are an anteroposterior diameter more than 7 mm**,** non compressible luminal structure (Target lesion), wall thickening and presence of appendicolith.

Pelvic ultrasound can be very much helpful especially in females for excluding the pelvic pathologies like tubo-ovarian abscess or ovarian torsion which may mimic acute appendicitis. The major disadvantage of USG is operator- dependent accuracy.

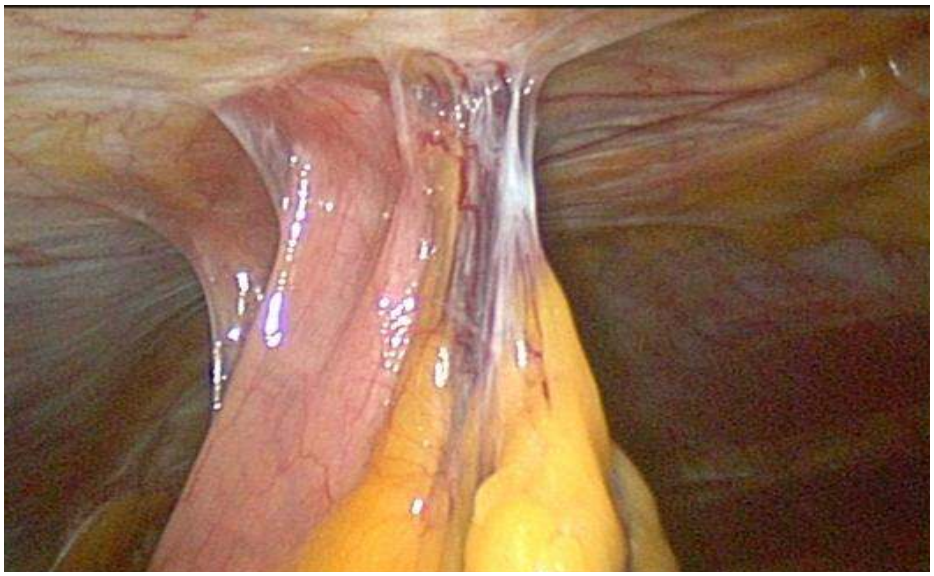
Classic findings in CT abdomen are distended appendix more than 7 mm diameter and circumferential wall thickening and enhancement. It has a sensitivity of approximately 90% and a specificity of 80 – 90%[4] in diagnosing appendicitis in patients with RLQ pain. Nonetheless, because

of its cost and the radiation exposure associated with it, the use of CT as a routine investigation in all patients with acute RLQ pain is not justified.

Mesenteric and bowel adhesions are believed to be the cause of both acute and chronic abdominal pain increasingly. Associated symptoms include vomiting and abdominal distention. Adhesions are frequently seen in an operated abdomen. But it can also occur in a virgin abdomen due to some other pathology like appendicitis or tuberculosis.

Adhesions are most commonly found between the peritoneum and mesentery or other viscera. It can also occur between the mesentery and bowel or between the bowel loops.

Mesenteric lymphadenitis is a non specific acute inflammation caused usually due to yersinia enterocolitica. Occasionally virus, parasite or fungal infection may be the cause. It is common in children and young females. It often mimics appendicitis and the appendix is usually normal in these patients.



Adhesions

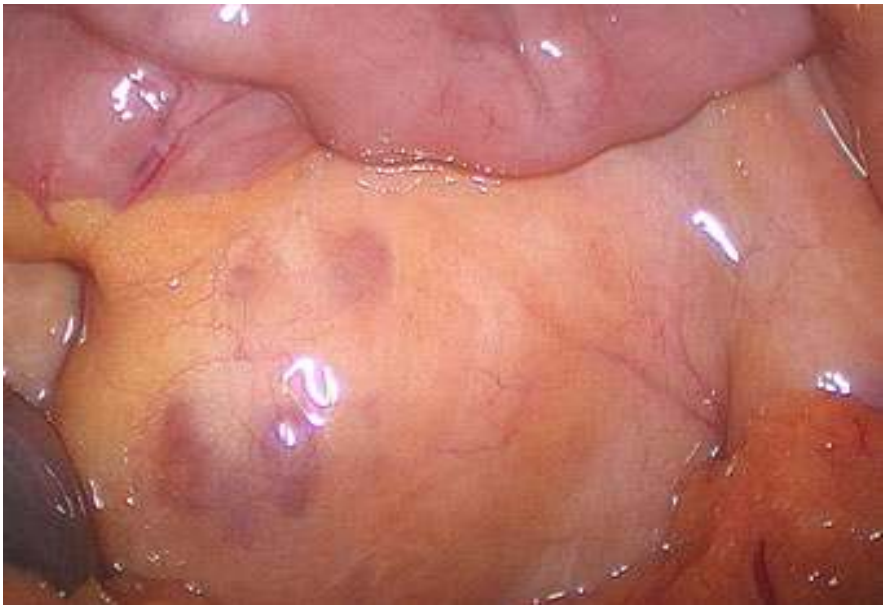
Adhesiolysis

Other associated features include slight fever and vomiting, but bowel habits are normal. Leucocytosis is common but rapidly regresses. Ultrasonogram is usually normal. It is usually self limited and the treatments are bed rest, reassurance, analgesics and follow up.

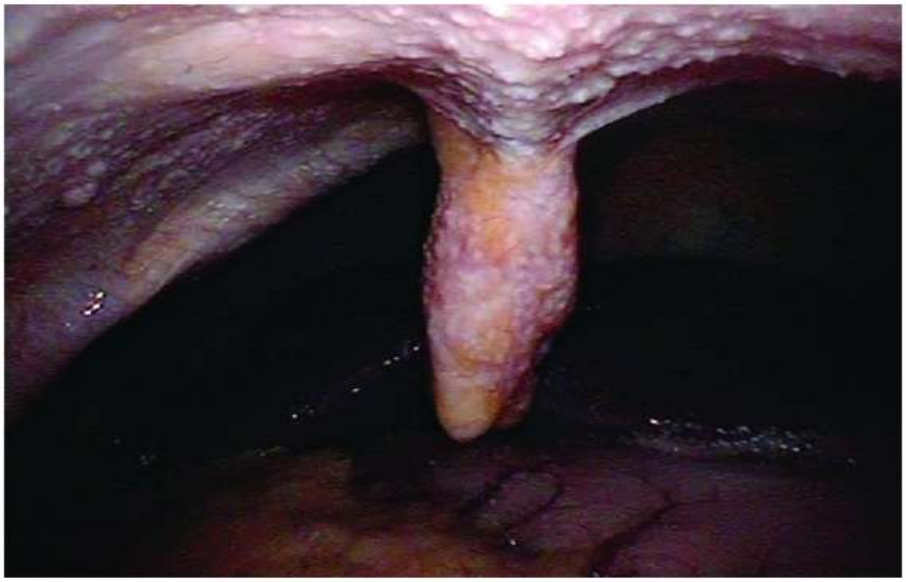
The common sites affected in abdominal tuberculosis include intestine, peritoneum, mesentery with its nodes, omentum and solid viscera like liver and spleen (miliary TB). Tuberculosis of the terminal ileum, ileocaecal junction, peritoneum and mesentery with its lymph nodes are the usual causes of RLQ pain.

The most common site affected in GIT is terminal ileum and ileocaecal junction. Apart from RLQ pain, patients present with mass in RIF (35%), fever, diarrhea, anemia, loss of weight and loss of appetite. Antituberculous drugs should be started once the diagnosis is confirmed.

Surgical treatment is indicated in patients with intestinal obstruction, severe haemorrhage, bowel perforation and intra-abdominal abscess.



Mesenteric Lymphadenitis



Abdominal tuberculosis

Other possible cause of right lower quadrant pain in gastro intestinal tract is diverticulitis, which often arises in the right hemicolon. Even sigmoid diverticulitis can present in the right lower quadrant if a large sigmoid loop is present.

Meckel's diverticulum is the most common congenital anomaly of the small intestine, arising from the antimesentric border of the terminal ileum containing all three layers of the bowel. It is present in 2% of the population, 2 feet proximal to ileocaecal valve, 2 inch in length and 2% are symptomatic.

It is asymptomatic in most of the patients. Infection of a Meckel's diverticulum is a special type of diverticulitis that is only rarely correctly diagnosed preoperatively.

The features of meckel's diverticulitis often mimic acute appendicitis. Severe haemorrhage is a common presentation in children. It may be the leading point in intussusception or volvulus of the small bowel.

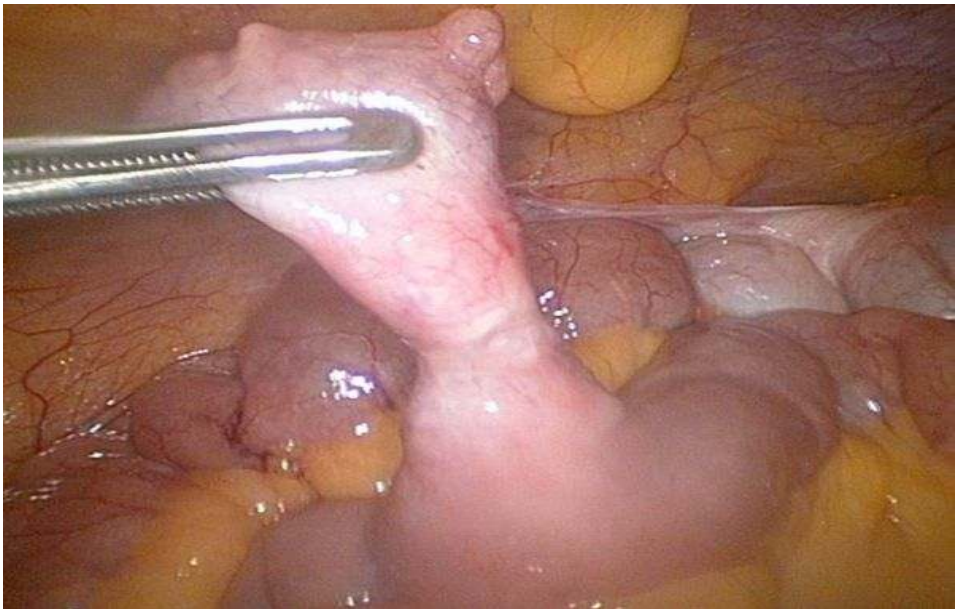
Though the investigation of choice is technetium radioisotope scan, laparoscopy is a very useful diagnostic as well as therapeutic procedure.

Mesenteric panniculitis is an inflammatory disease of mesentery with mesenteric fat necrosis, inflammation and fibrosis. Excessive thickening of the mesentery near its root with multiple discrete nodules are typical. Bowel edema, congestion and ischemia may manifest when there is venous and lymphatic obstruction of the mesentery.

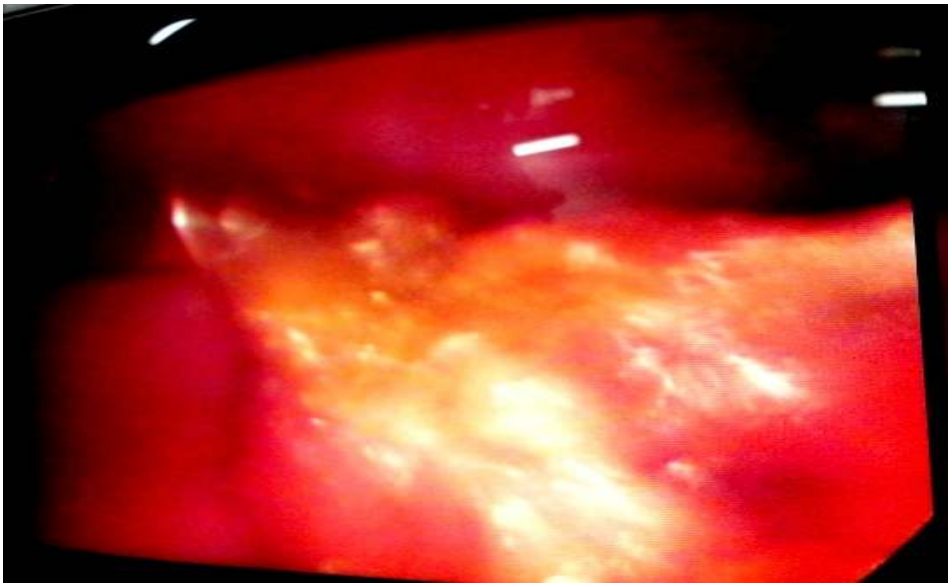
Small bowel mesentery is commonly involved but mesocolon also can be affected. It is common in middle aged men. Spontaneous resolution can occur. Other than abdominal pain, manifestations like features of obstruction, abdominal distention and tender mass can occur.

PID is an inflammatory disease that generally affects the fallopian tubes and ovaries, but can also affect the uterus. Statistical studies show that one in four women suffers from adnexitis and in 60% of cases the infection becomes chronic.

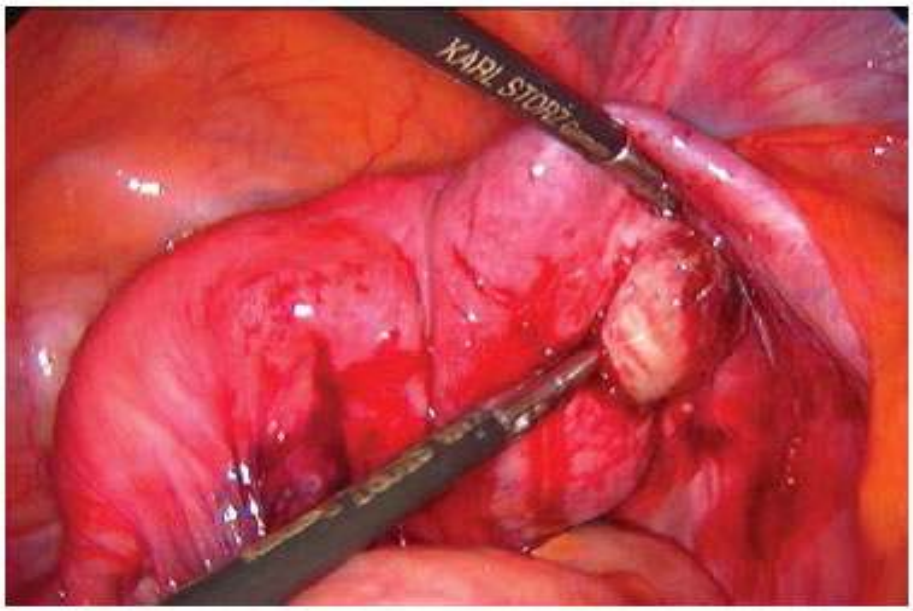
Symptoms include pain in the abdomen due to swollen fallopian tubes, fever, dysmenorrhea and altered bowel habits. Conservative treatment is sufficient in most cases and surgery is not necessary. It includes administration of antibiotics, analgesics and anti-inflammatory substances. Sitz baths are often useful.



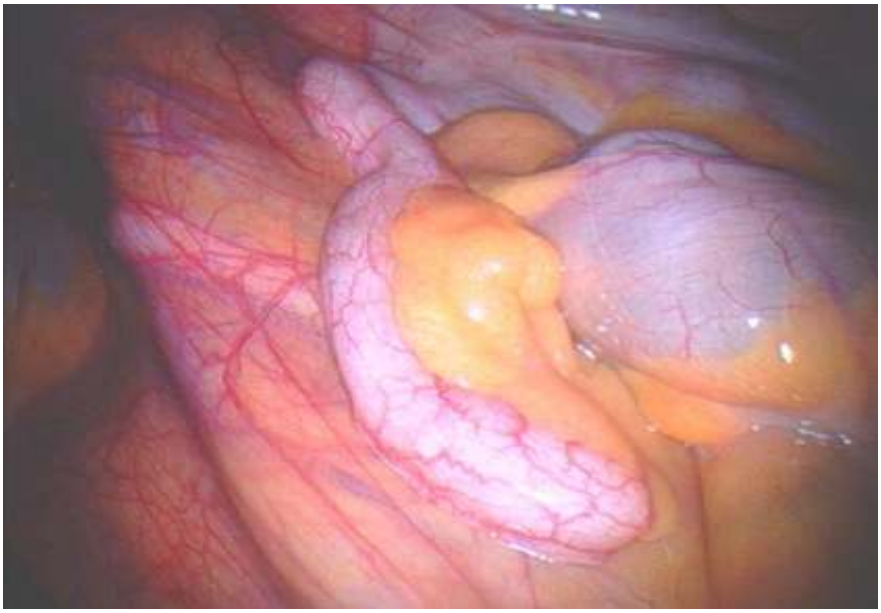
Meckel's diverticulitis



Mesenteric panniculitis



Right Adnexal cyst



Normal Study

Ovarian torsion accounts for only about 3 percent of gynecologic emergencies. In 70 percent of cases, it is diagnosed in females between 20 and 39 years of age.

Patients with ovarian torsion often present with sudden onset of sharp and usually unilateral lower abdominal pain. It is accompanied by nausea and vomiting in most of the patients. Fever occurs when there is necrosis. Surgical treatment of ovarian torsion includes laparoscopy to uncoil the ovary which has undergone torsion and possibly oophoropexy to fixate the ovary which is likely to undergo torsion again.

Another gynecological disease that can cause acute right lower quadrant pain is ectopic pregnancy. Its manifestations include secondary amenorrhea, positive pregnancy test, normal inflammatory parameters and abnormal vaginal bleeding.

Extra uterine pregnancy often becomes symptomatic when it perforates, causing a potentially life-threatening intra-abdominal hemorrhage. Patients may have a history of bouts of adnexitis or a prior extrauterine pregnancy. Laparoscopy gives an excellent chance of diagnosis in case the other investigations are inconclusive.

Right lower quadrant abdominal pain usually presents as a diagnostic challenge and comprises 10 percent of all emergency admissions. Clinical examination often fails to yield a diagnosis, especially in obesity. Blood investigations may be diagnostic for certain conditions, but in most circumstances, they are inconclusive.

The history and physical examination are the key elements leading to the determination of the diagnosis and of the further management of the patient. The patient should be asked in general about the onset, duration, nature and intensity of the pain and also about certain specific features like altered bowel habits, nausea, vomiting and dysuria.

In female patients, a gynecological history is obligatory and often points to the diagnosis. In taking the history, the surgeon should always try to gain information of differential diagnostic value in order to determine which further tests should be performed.

The physical examination serves the same purpose. Abdomen should be thoroughly examined, look for guarding and peritoneal signs, check the renal beds and potential hernia sites, and perform a digital rectal examination. Female patients should have a per vaginal

examination as well, as a component of the acute gynecological consultation.

Laparoscopy is ideally suited for use in diagnosing and potentially treating patients with unexplained RLQ pain. Several studies have reported the safety and efficacy and also documented good results following diagnostic laparoscopy. Our approach was to view the operation as mostly a diagnostic test but also a potential therapy.

Testing with diagnostic laparoscopy should be performed only after the history and physical examination have been completed. Its purpose is to confirm the diagnosis that seems most likely among the possible differential diagnoses and to exclude all of the competing diagnoses.

If appendicitis is suspected, a blood sample is drawn for laboratory testing[5] and an ultrasonographic examination of the abdomen is indicated. These tests can be performed quickly and with negligible distress to the patient. It should be borne in mind, however, that these tests are neither very sensitive nor very specific.

Conditions affecting the female reproductive tract, such as adnexitis, symptomatic ovarian cysts, or extrauterine pregnancy, are common causes of right lower quadrant pain. Thus a properly performed gynecological examination is recommended, combined with an endovaginal ultrasonographic examination, as long as it can be performed in an acceptably short time frame.

The same procedure applies to patients who present with additional symptoms or findings in the urological area, e.g., renal percussion tenderness, dysuria, or macrohematuria or in the orthopedic/neurological area, e.g., movement-related pain, radicular or pseudoradicular symptoms, and percussion tenderness of the spine.

Hence other investigations that may be warranted in these circumstances include extended urinalysis, voiding urography, plain x-rays of the pelvis and spine.

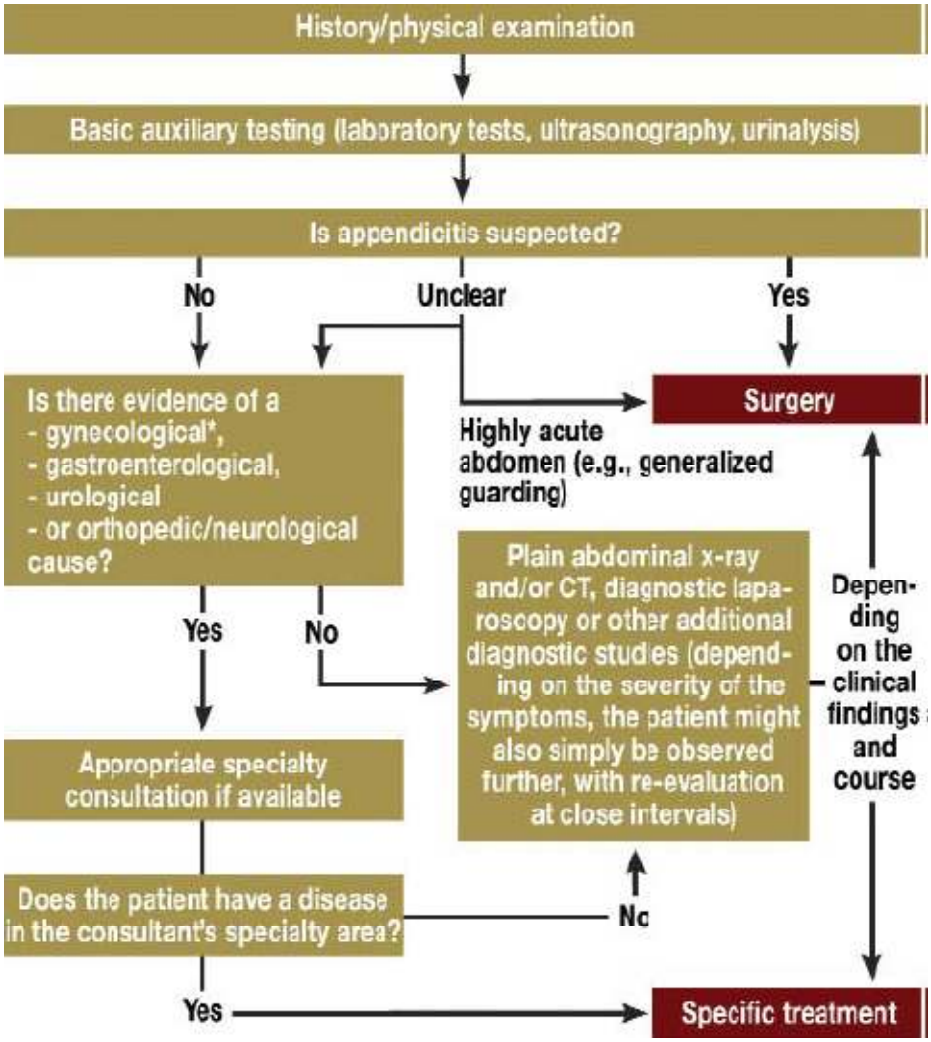
If there are right lower quadrant symptoms suggesting perforation (e.g., due to right sided diverticulitis) or ileus, then plain abdominal and chest x-rays should be obtained to determine the possible presence of free intraperitoneal air or static intestinal loops.

Tumors of the right hemicolon can cause right lower quadrant pain only after a long, chronic course; the affected patients may also complain of weight loss, altered bowel habits, and blood in the stool.

If the clinical examination and ancillary tests do not provide a clear answer and the abdominal symptoms and signs are so severe that the presence of a life-threatening condition cannot be ruled out with certainty, diagnostic laparoscopy should be performed.

Diagnostic laparoscopy can also be used instead of laparotomy when an acute disease process in the abdomen has already been successfully diagnosed on the basis of the clinical examination, laboratory tests, and imaging studies.

Laparoscopy often enables immediate treatment of the problem, e.g., by laparoscopic appendectomy. The known contraindications to laparoscopy should be borne in mind, however, including a history of extensive abdominal surgery.



Algorithm for the management of patients presenting with RLQ pain

DIAGNOSTIC LAPAROSCOPY

Technology has efficiently miniaturized our eyes and extended our hands to perform microscopic and macroscopic operation in sites which formerly could be reached only with lengthy incisions.

Minimal access surgery is an integration of modern technology and surgical innovation which aims to accomplish diagnostic and therapeutic goals with minimum somatic and psychological trauma.

Minimal access techniques are less disabling, less invasive and are with maximal cosmetic benefit.

The use of laparoscopy for diagnostic purpose dates back to beginning of 20^{th} century. Though surgical scientists pioneered its use as a diagnostic tool, with advancement and sophistication of imaging modalities it was put into oblivion. Despite the strong advocacy by some pioneering surgeons, the attitudes of others were steadfastly slow to adopt and acquire this epoch-making advance of laparoscopy.

But the scientific evolution in instrumentation, availability of widespread knowledge and finally introduction of therapeutic

laparoscopy has revived the benefits of diagnostic laparoscopy. The advent of therapeutic laparoscopy has been followed by a new look at diagnostic laparoscopy.

With the additional advantage of doing various ancillary procedures like biopsy and laparoscopic imaging (USG) today the role of diagnostic laparoscopy is redefined. It has proved its role in positive diagnostic yield and safety.

It plays a vital role in the evaluation of acute and chronic abdominal conditions, benign and malignant diseases, trauma etc

Diagnostic laparoscopy should not replace the preoperative workup but it should always be a sequel to careful clinical and radiological evaluation.

The instruments used are, Laparoscope, Computer chip video camera, Light source and Video monitors

Access equipments (to create pneumoperitoneum) include insufflators and pressure monitor, gas tank (carbon dioxide or alternate), and trocar sheaths (with air tight one way valves)

Working instruments are atraumatic graspers, dissectors, scissors, suction apparatus and irrigator, clip applicator, staplers, specimen retrieval bags, suture materials, needles and needle holders

Laparoscopic surgery is ideally a harmonious blend of advanced videoscopic technologies, carefully planned and precisely engineered instruments and skills of the surgeon. The revolution in laparoscopy has been made possible only by the tremendous advance in instrumentation that has taken place in the recent past decades.

The safety and speed of a laparoscopic surgery mainly depends on the quality of video image produced.

Rigid laparoscope is the commonly used laparoscope is based on Hopkins solid rod lens system. It consists of objective lens, an image reversal system and an eyepiece.

The rod lens made up of quartz has replaced glass lenses. It provides excellent light transmission and a large angle of view that leads to a full format video image.

Diagnostic laparoscopy provides images of larger size, maximum light and less distortion.

Most of the laparoscopes in use are rigid. Two essential components of rigid laparoscope are size and angulations. Laparoscopes with the following sizes and angulations are available.

The various sizes available are 3, 5, 7, 10 mm in diameter. Angles used include 0, 12, 30, 45, 70, 90 & 120. The commonly used size and angle are 5 or 10 mm and 0^0 or 30^0 respectively.

The intrinsic limitation of rigid scopes is field of vision. The field of vision for human eye is 180^0 but a 5mm and 10 mm laparoscope can provide only 90^0 and 76^0 respectively.

Ideal light source is a high intensity cold light source. A 300 Watt xenon or halogen lamp is preferred. A cold light source (the source kept at a distance) is preferred to prevent overheating of the tip of the laparoscope. This is transmitted by fibreoptic bundles kept circumferentially around the lens system (Hopkins). This can be controlled manually or automatically.

Light cables are of two distinct types which include a fibre cable and fluid cable.

In fibre cable, light is transmitted by glass fibres. They are very light and reinforced by metal spiral which makes them more rigid and resistant to deformation.

Fluid cable transmits through liquid permitting more even transmission of light across the spectrum. For this reason this is preferred for videotaping and laparoscopic photography. The main disadvantage is loss of brightness of 20 to 30 % compared with fibre cable.

Most camera systems are separate from the laparoscope though integrated are available. Most important part of a camera is silicon chip that is responsible for receiving images from laparoscopy. This chip is termed as charge coupling device (CCD).

Based on this there are two types of camera -single chip and three chips.

Single chip contains one CCD which receives all the three primary colours. The resolution power is 470 lines.

Three chips contain three CCDs. Each CCD receives each primary colour separately. The resolution power is 700 lines.

Three important features in camera system are Iris, White balance and Gain.

Iris is used to control the amount of light processed by the camera. Before each operation, the system should be calibrated by focusing on a white surface activating the white balance feature of the camera. This is done on the assumption that white surface contains all the three primary colours. This is a very significant step before operating as this defines the operating conditions of the system.

Gain is the amount of the light from the visual field that is processed by the camera.

The different types of signals are Composite video image, Y / C (Brightness and colour) and RGB (Red, Green, Blue).

Composite video image is the simplest type of signal transmission by the camera to the monitors and the recording equipment. Image is not split into components.

Y / C image is split into two components – brightness and colour. They are reconstituted by an equipped video recorder to form super VHS image.

RGB image is split into 3 components – Red, Green & Blue. They are reconstituted to form colour picture.

Conventional TV monitors project the image in 525 horizontal lines. High resolution monitors use 700 lines suitable for 3 chip cameras. Three variables that affect the quality of image are horizontal scan rate, dot pitch and signal termination.

Horizontal scan rate is defined as number of times the electro beam traverses the screen. Higher the rate sharper will be the image.

Dot pitch is the distance between two phosphor dots on the screen. Smaller the distance sharper the image. Less than 0.28 mm is considered optimal.

If the monitor is the last item in the array of monitor recording devices, the signals should be terminated by passing it through a resistor. Otherwise picture will not be clear.

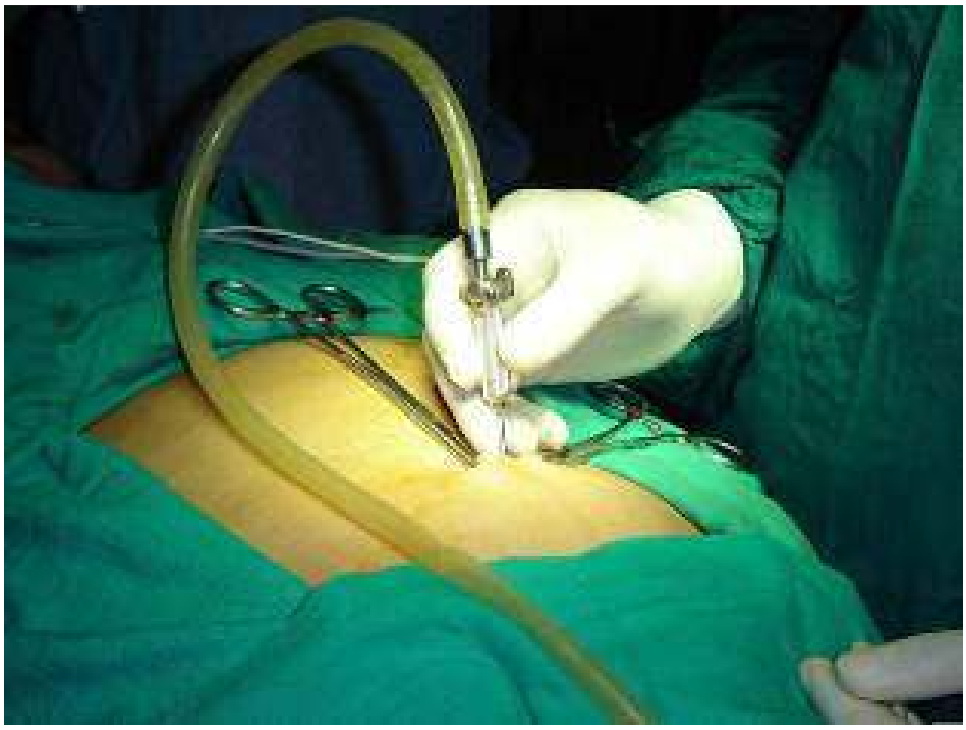
Pneumoperitoneum is created and maintained by two techniques

a. Blind or closed technique
b. Open technique

In blind or closed technique, the pneumoperitoneum is created with by puncture of abdominal wall with an insufflations cannula (needle).

A veress needle is currently the most commonly used one for this purpose. It is made up of a sharp tipped cannula that contains a spring activated blunt obturator projecting beyond the sharp tip to avoid injury to intraperitoneal structures. It has an opening for gas insufflation. It was devised for safe Janos Veress in 1938. It has proved to be one of the greatest boons to laparoscopy.

It is mandatory to check the free intraperitoneal position of the needle by one of the following tests. The tests that can be done are Quadro test, Needle test, Spring test, Hiss test (vacuum phenomena) and Aspiration test.



Closed technique

To avoid the visceral and vascular injury, Hamith M Hasson devised an instrument called Hasson's cannula. In open method the abdominal wall is cut open in layers and then a Hasson's cannula is inserted. It consists of an olive shaped sleeve, a blunt trocar and two wings to which sutures may be tied. This is preferred in cases where we suspect intraabdominal adhesions like tuberculosis or already operated abdomen.

Open Hasson's method

Once the pneumoperitoneum is established, trocars must be inserted to allow the passage of the telescope and operating instruments into the abdomen. Their tip is always sharp. They are provided with a safety shield or with a retractable tip to avoid organ injury.

Two types of trocars in practice are 11 mm trocar sheath for 10 mm instruments and 5.5 mm trocar sheath for 5 mm instruments

It consists of a metal tube with a sharp conical tipped or pyramidal tipped obturator. The pyramidal tipped obturator and beveled cannula

permit a more controlled and safer entry. The outer surface of trocar should be dull to minimize the reflection of light in the abdomen. Gas escape is prevented by a flap gate valve or trumpet valve.

The outer end of the trocar sheath has a gasket or washer which tightly grips any instruments passing through the sheath to minimize air leak.

Trocars may be reusable or disposable. Reusable trocars share the environment, less expensive but require manpower for cleaning. Disposable trocars are more expensive and have a radiolucent sheath that does not impair during radiological studies.

An insufflator is designed to deliver gas for establishing and maintaining the pneumoperitoneum. To guarantee a smooth operative course the maintenance of pneumoperitonem with a constant intra abdominal pressure is of great importance this can be accomplished by a pressure and a volume regulated insufflators .

In addition to gas delivery the insufflators are used to measure the pressure at the tip of veress needle or trocar sheath during insufflations,

preselected and actual intra abdominal pressure, total amount of insufflated gas and the maximum flow rate.

The flow of gas is controlled either in a stepwise fashion (low, medium, high) are preset by a dial in litres/minute. Low flow rate is around 1L / min and a flow rate is high when it is above 4 L / min.

In blind technique, a flow rate of 1 L / min is used initially after achieving the maximum abdominal pressure a continual display of a flow rate greater than 1L/min is indicative of leak from a system, most commonly from one of the cannula site. Flow is directly proportional to delivery pressure and inversely proportional to impedance.

The pressure monitor reflects total resistance to the instillation of gas. This monitor reading reflects both the pressure within the abdomen and the impedance to flow within the delivery apparatus. Usually the intra abdominal pressure around 10- 12 mm of Hg.

An ideal insufflating agent should be colourless, physiologically inert and does not explode in the presence of electrocautery or laser coagulation, low tissue solubility, high blood solubility, readily available, inexpensive and nontoxic. Blood solubility should be high because it will minimize the effects of inadvertent injections into the circulation.

Carbon di-oxide is the Most commonly used gas for insufflation. It is odourless, colourless gas. It is readily available and stable gas which is naturally formed in the tissues and eliminated by lungs.

Other gases which can be used are nitrous oxide, helium and argon. The advantages and disadvantages of various agents are given below.

GAS	**ADVANTAGES**	**DISADVANTAGES**
Carbon di-oxide	Low risk of gas embolism Non combustible	Hypercarbia Acidosis Pain
Nitrous oxide	Low risk of gas embolism Decreased pain	Supports combustion
Helium	Stable acid-base status Does not support combustion	Subcutaneous emphysema Risk of venous gas embolism
Argon	Stable acid-base status Does not support combustion	Possible cardiac depression

Modern diagnostic laparoscopy permits not only a visual exploration of peritoneum and the surface of intra abdominal organs, but also a surgical exploration of otherwise inaccessible areas like lesser sac, hiatus, or the structures of the hepatoduodenal ligament. Laparoscopic ultrasonography and guided biopsy are frequently performed.

Since the patient position needs to be changed intraoperatively, care has to be taken to strap the patient safely on the table. The procedure usually begins in the reverse trendelenburg position for inspection of upper abdomen. For a systematic inspection of the lower abdomen, it has to be changed to trendelenburg position.

The video monitor has to be placed depending on which pathological conditions suspected. To explore the findings in right lower abdomen, the screen should be located at the right side of the patient and the surgeon stands on the left side.

The number and sites of trocars depends on the indication and suspected findings. In most cases, the periumbilical area is selected for the placement of first trocar either by using a veress needle or open technique. Open technique is always preferred.

The 0^0 or 30^0 telescope is passed through the trocar sheath and the peritoneal cavity is thoroughly inspected. The subsequent trocars are inserted under visual control.

Subsequently, the patient is brought to a trendelenburg position and systematic inspection of the right lower quadrant is done. The right colon, caecum with appendix, right iliac vessels and pelvis are explored.

The absolute contraindications of laparoscopy are unstable cardiopulmonary status, uncorrectable or severe coagulopathy generalized peritonitis, acute bowel obstruction, abdominal wall infection and an uncooperative patient (for local anaesthesia).

Relative contradindicaations are chronic cardiopulmonary disorder, correctable or minimal coagulopathy, prior abdominal surgery, abdominal hernias, obesity and tense ascites.

There are certain specific complications that can occur during laparoscopy.

The following complications can occur during the insertion of veress needle in closed method.

Position of needle	Consequence
Preperitoneum	Emphysema
Hollow viscus	Perforation/adhesion
Localized adhesion	Localized pneumoperitonem
Omentum	Omental emphysema
Blood vessel	Bleeding gas embolism
Retroperitonem	Mediastinal emphysema

Cardiopulmonary embarrassment and gas embolism may be a consequence of pneumoperitoneum.

Hollow viscus perforation, solid viscus or a blood vessel injury may occur during main trocar insertion.

Proper planning, expert judgement and meticulous surgical technique can prevent complications while still allowing the patients to experience the benefits of minimally invasive surgery.

Graspers are used laparoscopically to hold tissue and spread it during dissection. In graspers both traumatic and atraumatic jaws are available. Curved fine tipped graspers are used for dissecting tubular structures, passing ligatures and pinpoint diathermy. Flat, rounded graspers with teeth are used for grasping, retracting thick walled structures or for extracting the appendix or the gall bladder from the abdomen.

Patients are prepared and evaluated preoperatively as for other surgical procedures. Most of the patients receive a gastric and urinary decompression. The abdomen is prepared and draped widely so that the field need not be changed when a laparotomy becomes necessary.

In most cases, the general anaesthesia is required. In elective situations, laparoscopy under local anaesthesia with sedation is possible as well. However, in these cases CO_2 should be replaced either by nitrous oxide or helium. Carbon di-oxide causes abdominal pain and is thus not suitable for laparoscopy under local anaesthesia. As soon as any intra abdominal manipulation is considered, a general anaesthesia is mandatory.

Modern diagnostic laparoscopy permits not only a visual exploration of peritoneum and the surface of intra abdominal organs, but also a surgical

exploration of otherwise inaccessible areas. Laparoscopic ultrasonography and guided biopsy are frequently performed.

Since the patient position needs to be changed intraoperatively, care has to be taken to strap the patient safely on the table. For a systematic inspection of the lower abdomen, a trendelenburg position is optimal. The video monitor has to be placed depending on which pathological conditions suspected. For findings in right lower abdomen, the screen should be located at the right side of the patient and the surgeon stands on the left side.

The number and sites of trocars depends on the indication and suspected findings. In most cases, the periumbilical area is selected for the placement of first trocar either by using a veress needle or open technique. Open technique is always preferred.

The 0^0 or 30^0 telescope is passed through the trocar sheath and the peritoneal cavity is thoroughly inspected. The subsequent trocars are inserted under visual control.

The peritoneum of abdominal wall is explored first by placing this scope ventrally. Subsequently, the patient is brought to a trendelenburg

position. The right colon, caecum with appendix, right iliac vessels and pelvis are explored. The examination is continued by inspection of the left lower abdomen including sigmoid and pouch of douglas. In female patients, this is facilitated by elevating the uterus by a grasping forceps.

The principles of physiology in laparoscopy must be understood clearly for proper performance of the procedure.

Two most important factors in laparoscopy that must be understood for safer performance of the procedure include surgical ie, dissection and handling of tissues and Pneumoperitoneum.

The reduction of tissue injury to the abdomen by minimal dissection and gentle handling of tissues accounts for its many beneficial physiological effects.

The physiological effects of pneumoperitoneum, can be divided into two parameters which are mechanical effects due to increased intraabdominal pressure and chemical effects due to insufflated CO_2.

DIAGNOSTIC LAPAROSCOPY IN RLQ PAIN

Diagnostic laparoscopy is an effective way of evaluating right lower abdominal pain[6]. Though imaging modalities, such as ultrasonography, exist to aid in the detection of acute appendicitis, they have low sensitivity and specificity. Diagnostic laparoscopy, though invasive, is superior to transabdominal or transvaginal ultrasonography in the assessment of female adnexal organs when the diagnosis is in doubt.

The role of diagnostic and therapeutic laparoscopy in the right lower quadrant abdominal pain is now well established. As compared to preoperative radiological investigation or a watch and wait policy, laparoscopy yields an accurate diagnosis in more patients. It also provides greater visualization of other intra abdominal organs and can also be used for therapeutic purposes.

Although laparoscopy is not a substitute for good clinical judgment, early laparoscopy reduces the incidence of negative laparotomy, serious complications, and need for expensive preoperative investigations. Also it offers the advantages of enabling a rapid and accurate assessment and providing a high degree of certainty for any subsequent treatment decisions.

If surgeons with appropriate training and skills are available, therapeutic laparoscopy can then be used to manage the condition, with the added benefits of reduced pain, less wound morbidity, and a shorter recovery time.

Although many patients with acute appendicitis can be diagnosed based on history, physical examination, laboratory studies and imaging, there are significant number of patients in whom diagnosis remains elusive.

Diagnostic laparoscopy will provide a direct examination of the appendix and a survey of the abdominal cavity for the other possible causes of pain. One more important advantage of doing a diagnostic laparoscopy is that it can be extended to a therapeutic procedure in which the appendicectomy can be done laparoscopically.

It is of prime use in women of child bearing age in whom preoperative pelvic ultrasound or CT fails to give a diagnosis and a concern about the possible adverse effects of a missed perforation and peritonitis on future fertility sometimes prompts earlier intervention in this patient population.

Whenever the clinical findings lead to no clear diagnosis and particularly in young women who may be suffering either from appendicitis or from adnexitis, laparoscopy is a good option that should be considered if the patient wishes to avoid the radiation exposure associated with CT. In these patients with appendix being found normal in laparoscopy, about 75 percent of them were found to have an underlying gynaecological pathology[7].

Imaging studies cannot precisely identify the intra-abdominal adhesion. Hence diagnostic laparoscopy becomes the ideal investigation to diagnose it.

Also as adhesions are more common over scar sites, open adhesiolysis may result in recurrence.

Patients with adhesions pose two specific problems

a. Obtaining safe access
b. Performing safe adhesiolysis

In these patients, blind (Veress) insertion may be associated with high rate of complications. The best way to gain a safer access is by an open Hasson's technique. The best technique is to follow the line of tissue

adherence which results in less bleeding and less risk of injuring the adjacent viscera. The surgeon must resist the common tendency to excessively eliminate adhesions.

The enlarged grossly visible mesenteric nodes seen in diagnostic laparoscopy in a patient presenting with acute RLQ pain is usually due to acute mesenteric lymphadenitis. Laparoscopy is often needed to diagnose and to prevent missed appendicitis. We should also be aware that the multiple enlarged lymph nodes may be due secondaries from a GI malignancy. It is always better to take a biopsy of lymph node and send it for histopathological examination and act accordingly.

It is a very useful investigation for abdominal tuberculosis in that it aids in direct visualization of peritoneal cavity, to collect ascitic fluid for analysis even when there is minimal fluid and to take biopsy of suspected lesions. Biopsy can be taken from mesentery, bowel wall, peritoneum, nodes and suspected areas.

Acute peritoneal tuberculosis though rare, can present with acute RLQ pain which mimics an acute abdomen. Laparoscopy reveals straw coloured fluid with tubercles in the peritoneum and bowel wall.

MATERIALS AND METHOD

MATERIALS AND METHOD

Data was collected prospectively from October 2012 to November 2013 in patients with right lower abdominal pain admitted to the Emergency Department and subsequently transferred to the Department of General Surgery, KMCH, Chennai and undergone diagnostic laparoscopy were evaluated.

INCLUSION CRITERIA

- Patients admitted with right lower quadrant pain with other investigations (laboratory and USG abdomen) being inconclusive
- Patient of both sexes
- Patients with age from 18 years to 70 years
- Patients who are willing to give consent for diagnostic laparoscopy

EXCLUSION CRITERIA

- Patients with associated upper abdominal/left lower abdominal pain
- Patients with abdominal pain secondary to trauma
- Pediatric patients
- Patients with already diagnosed intraabdominal tumors
- Patients with cardiac diseases and COPD
- Patients who were diagnosed to have renal or ureteric calculi

Requisites

- Operating room set up
- Videocart having a monitor, insufflator, gas cylinder and light source
- Laparoscope
- Camera and light cable
- Operating instruments

VIDEOCART: Monitor,
Insufflator, Gas cylinder, Light source

Laparoscope, camera, light cable

Trocar and cannula

Operative instruments

Patient positioned and draped

PROFORMA

PROFORMA

- Patient name: Age: Sex:
- IP No:
- Department:
- Hospital:
- Chief complaints:
- Past history:
- General examination
- Vitals

  a. Pulse rate:
  b. Blood pressure:
  c. Temperature:

- **Abdominal examination**

  Inspection
  Palpation
  Percussion
  Auscultation

- Per Rectal Examination

- Cardiovascular examination

- Respiratory system examination

- **Investigations**

    1. Complete hemogram
    2. Urine routine
    3. Blood sugar
    4. Blood urea
    5. Serum creatinine
    6. Serum electrolytes
    7. USG abdomen
    8. Plain X ray abdomen erect AP view

- Findings in the diagnostic laparoscopy

DATA ANALYSIS AND RESULTS

DATA ANALYSIS AND RESULTS

In this prospective study, the role of diagnostic laparoscopy was analysed in 72 patients with RLQ pain in Govt Kilpauk Medical college hospital, Chennai from October 2012 to November 2013.

In the study period, 342 patients were admitted with acute RLQ pain. 75 patients were considered for diagnostic laparoscopy since their investigations (laboratory & ultrasonogram) were inconclusive.

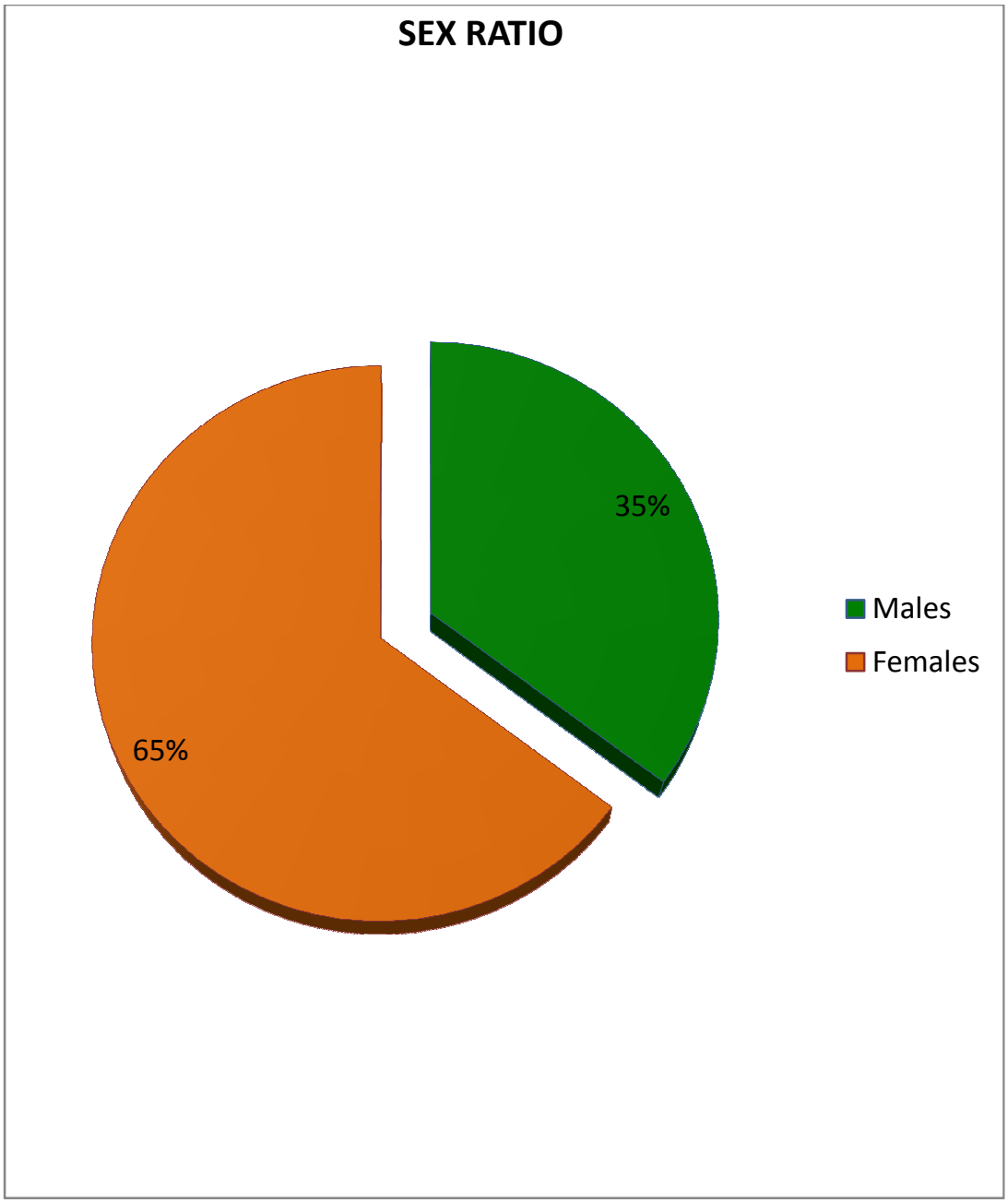
Among these 75 patients, 3 of them were not willing for diagnostic laparoscopy, which is an invasive diagnostic procedure. The remaining 72 patients gave consent for diagnostic laparoscopy and were included in the study.

The data from these patients were analysed and results studied.

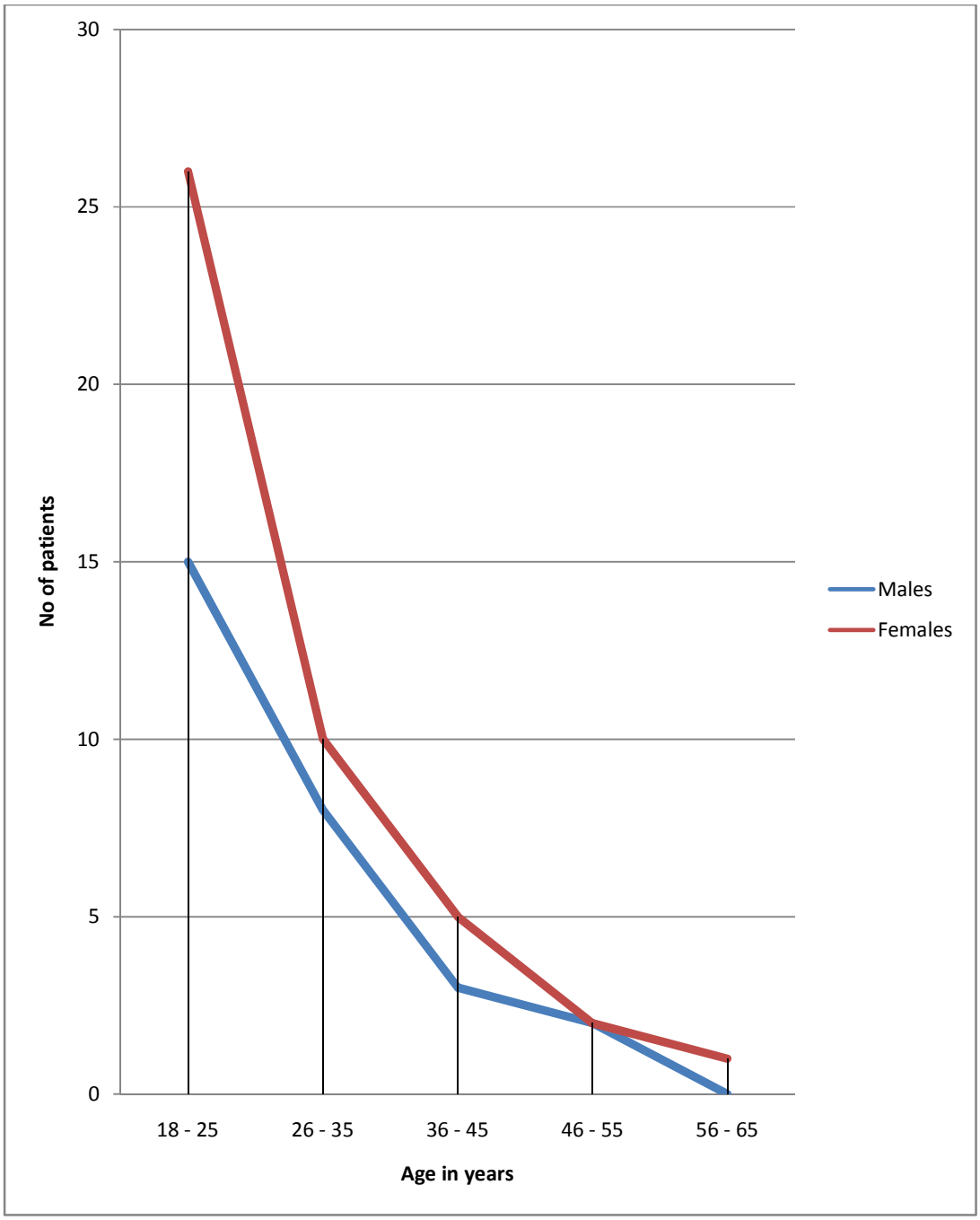
AGE AND SEX DISTRIBUTION

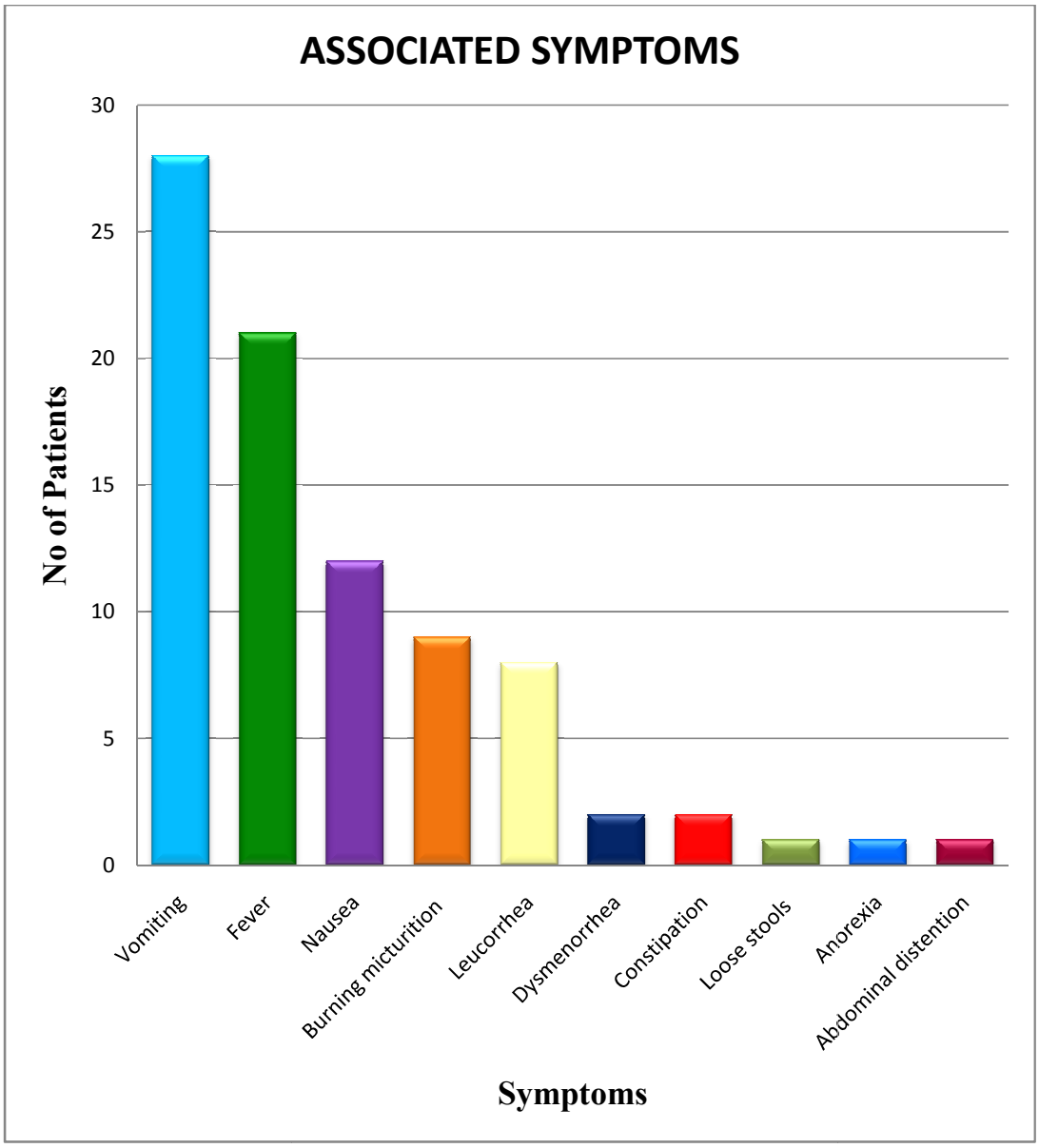
The age and sex distribution of these 72 patients are shown in the table.

Age	No of Patients		Total
	Male	Female	
18 - 25	15	26	41
26 - 35	8	10	18
36 - 45	3	5	8
46 - 55	2	2	4
56 - 65	0	1	1
Total	28	44	72


SEX RATIO
35%
65%
Males
Females

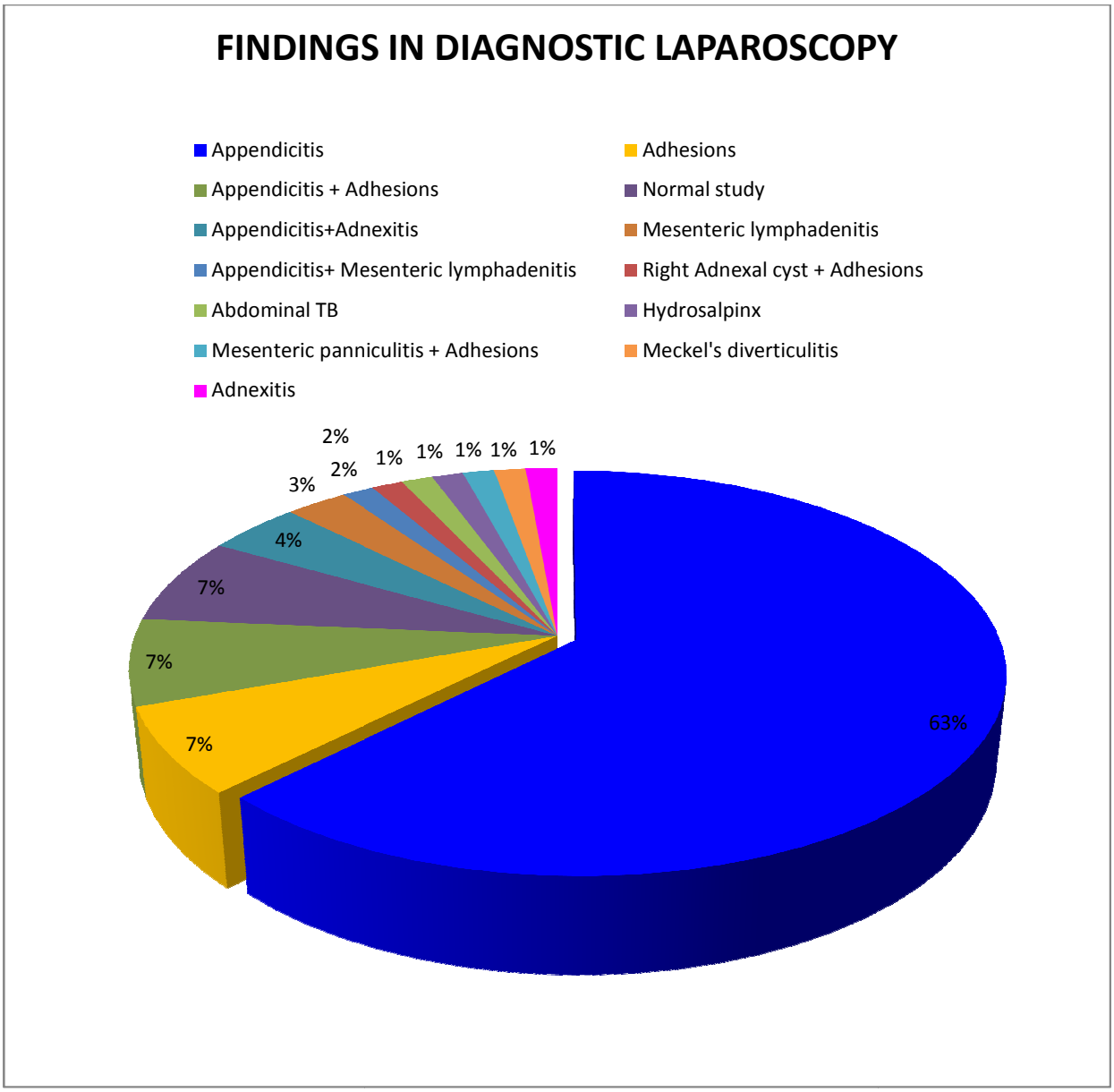
AGE DISTRIBUTION

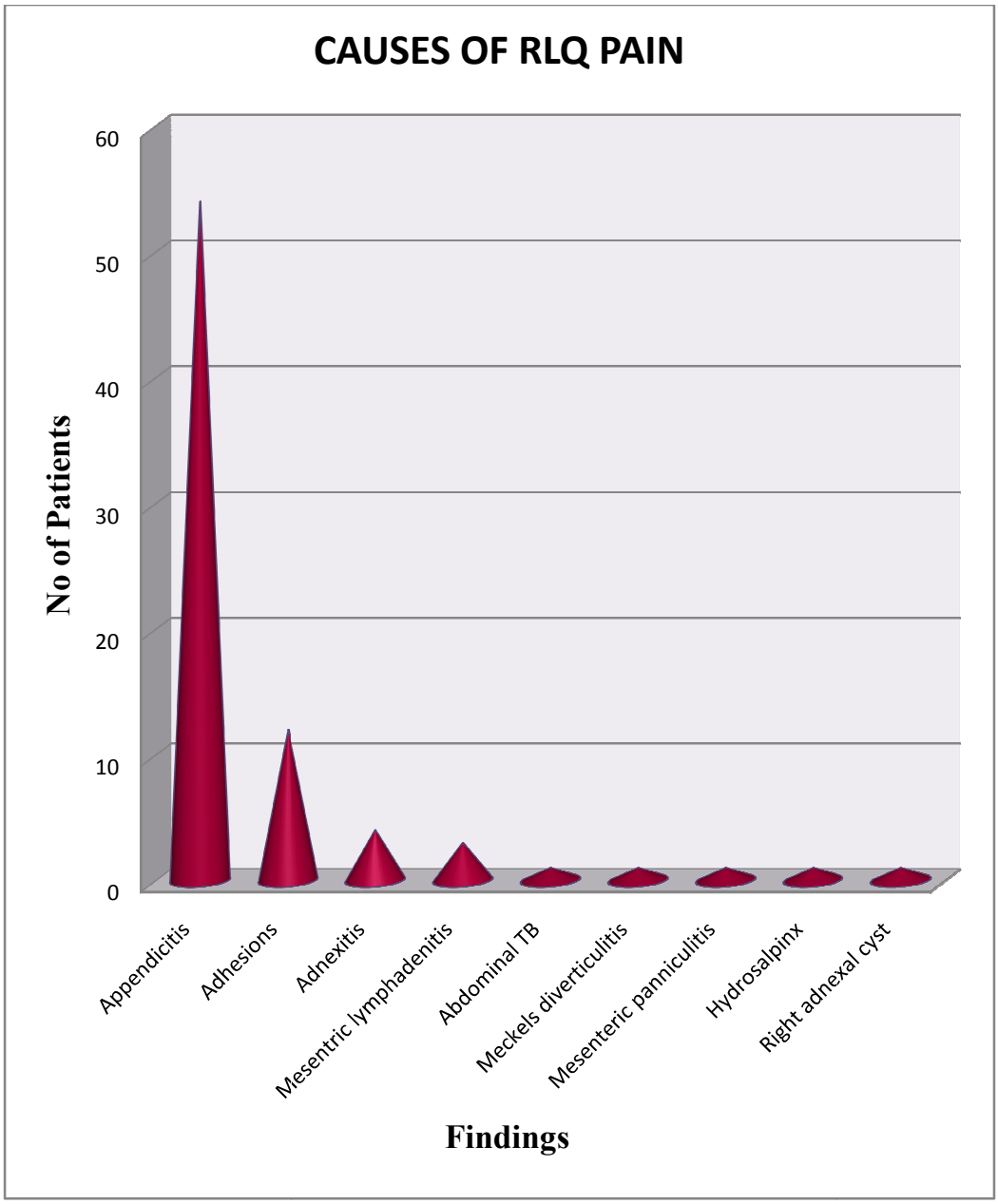



ASSOCIATED SYMPTOMS
No of Patients
30
25
20
15
10
5
0
Vomiting
Fever
Nausea
Burning micturition
Leucorrhea
Dysmenorrhea
Constipation
Loose stools
Anorexia
Abdominal distention
Symptoms

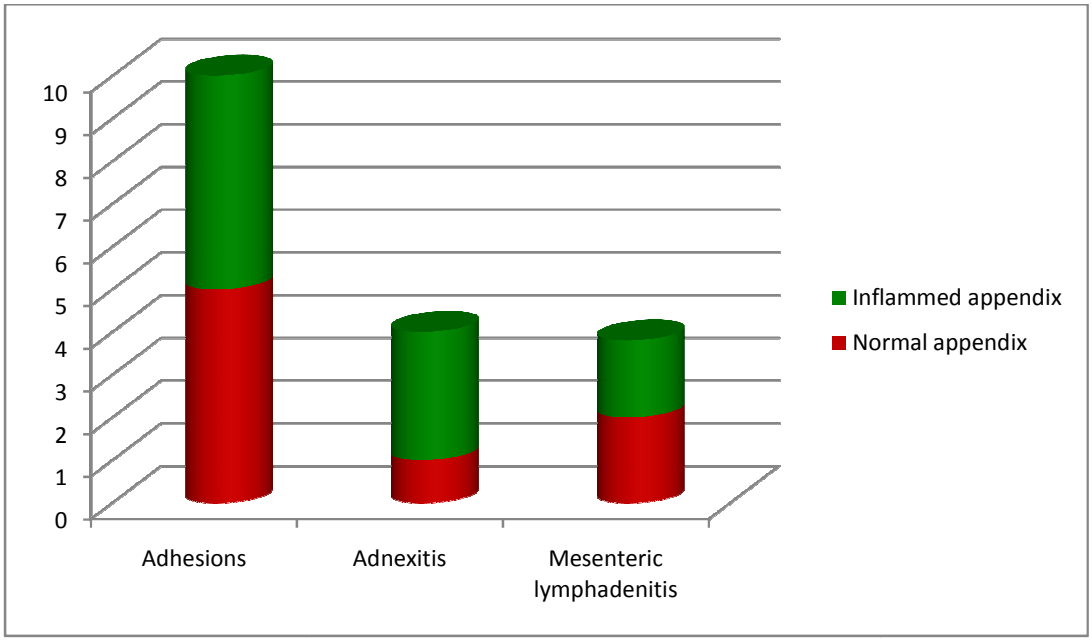
The 72 patients who came under our inclusion criteria were subjected to diagnostic laparoscopy by open Hasson's method. Following findings were noted.

Findings	**No of cases**
Appendicitis	45
Adhesions	5
Appendicitis + Adhesions	5
Normal study	5
Appendicitis + Adnexitis	3
Mesenteric lymphadenitis	2
Appendicitis + Mesenteric lymphadenitis	1
Right Adnexal cyst + Adhesions	1
Adnexitis	1
Hydrosalphinx	1
Mesenteric panniculitis + Adhesions	1
Meckel's diverticulitis	1
Abdominal TB	1
Total	**72**

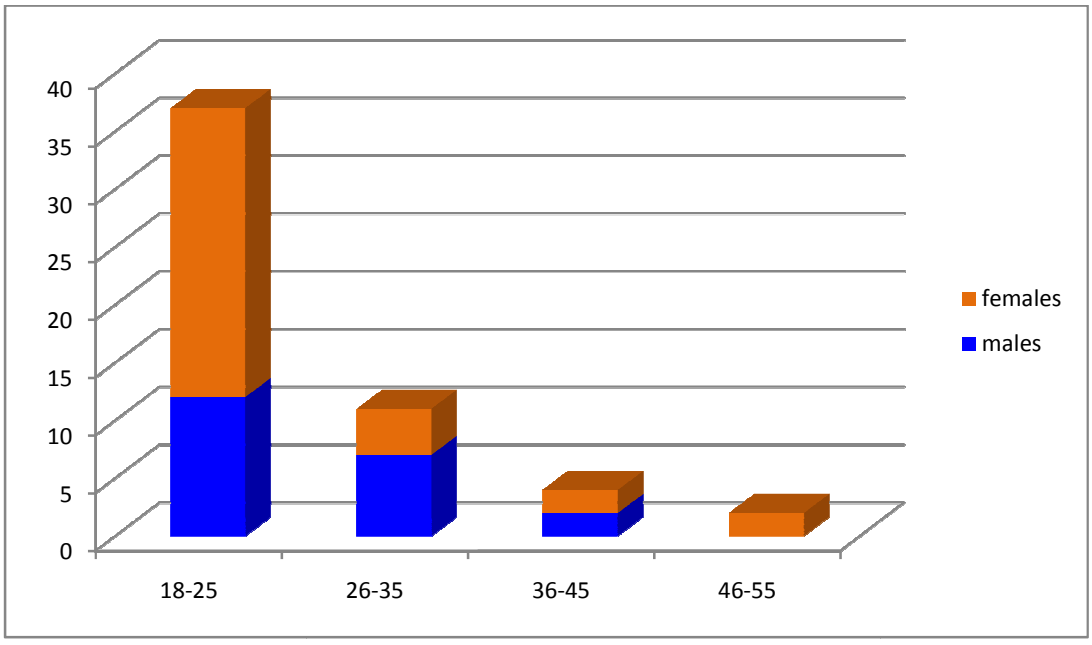

FINDINGS IN DIAGNOSTIC LAPAROSCOPY
Appendicitis
Adhesions
Appendicitis + Adhesions
Normal study
Appendicitis+Adnexitis
Mesenteric lymphadenitis
Appendicitis+ Mesenteric lymphadenitis
Right Adnexal cyst + Adhesions
Abdominal TB
Hydrosalpinx
Mesenteric panniculitis + Adhesions
Meckel's diverticulitis
Adnexitis
63%
7%
7%
7%
4%
3%
2%
2%
1%
1%
1%
1%
1%


CAUSES OF RLQ PAIN
No of Patients
60
50
40
30
20
10
0
Appendicitis
Adhesions
Adnexitis
Mesentric lymphadenitis
Abdominal TB
Meckels diverticulitis
Mesenteric panniculitis
Hydrosalpinx
Right adnexal cyst
Findings

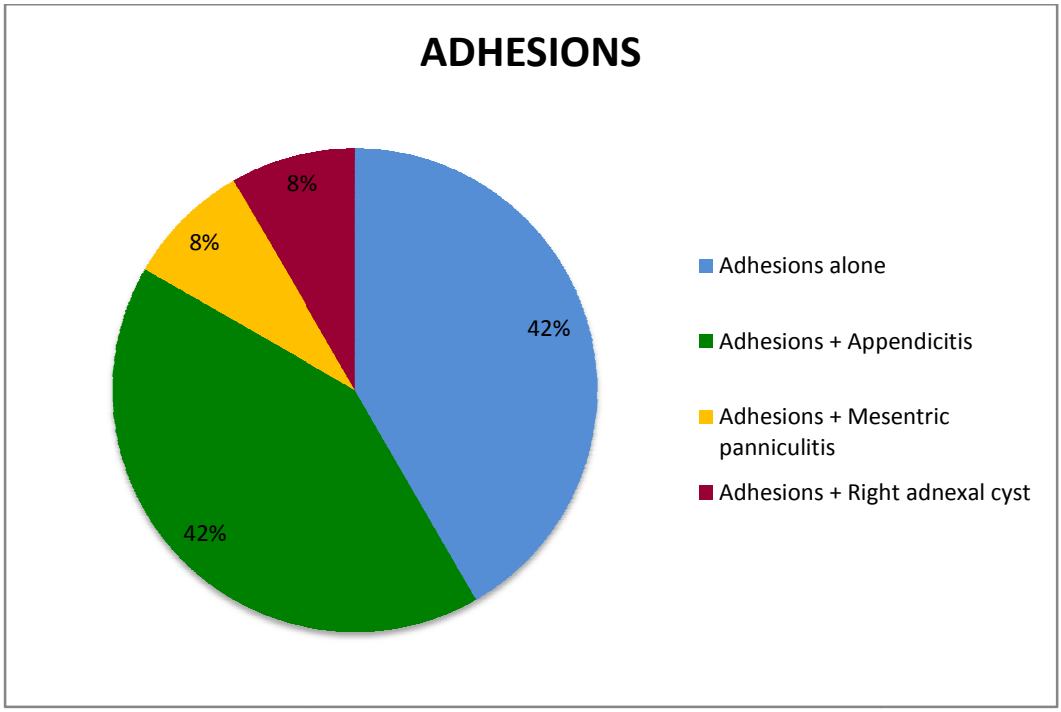
Concomitant pathologies	No of patients with normal appendix	No of patients with appendicitis
Adhesions	5	5
Adnexitis	1	3
Mesenteric lymphadenitis	2	1

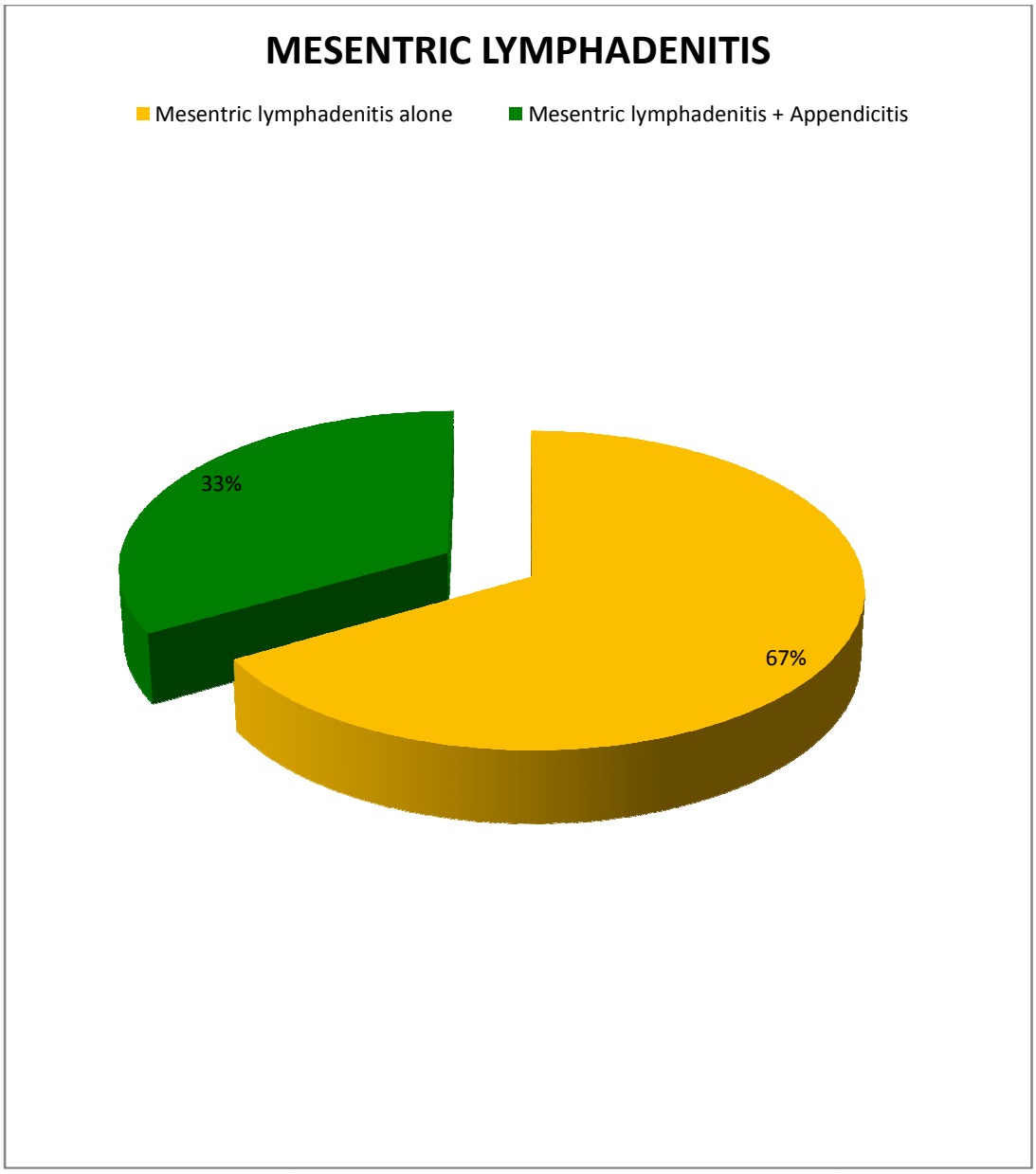


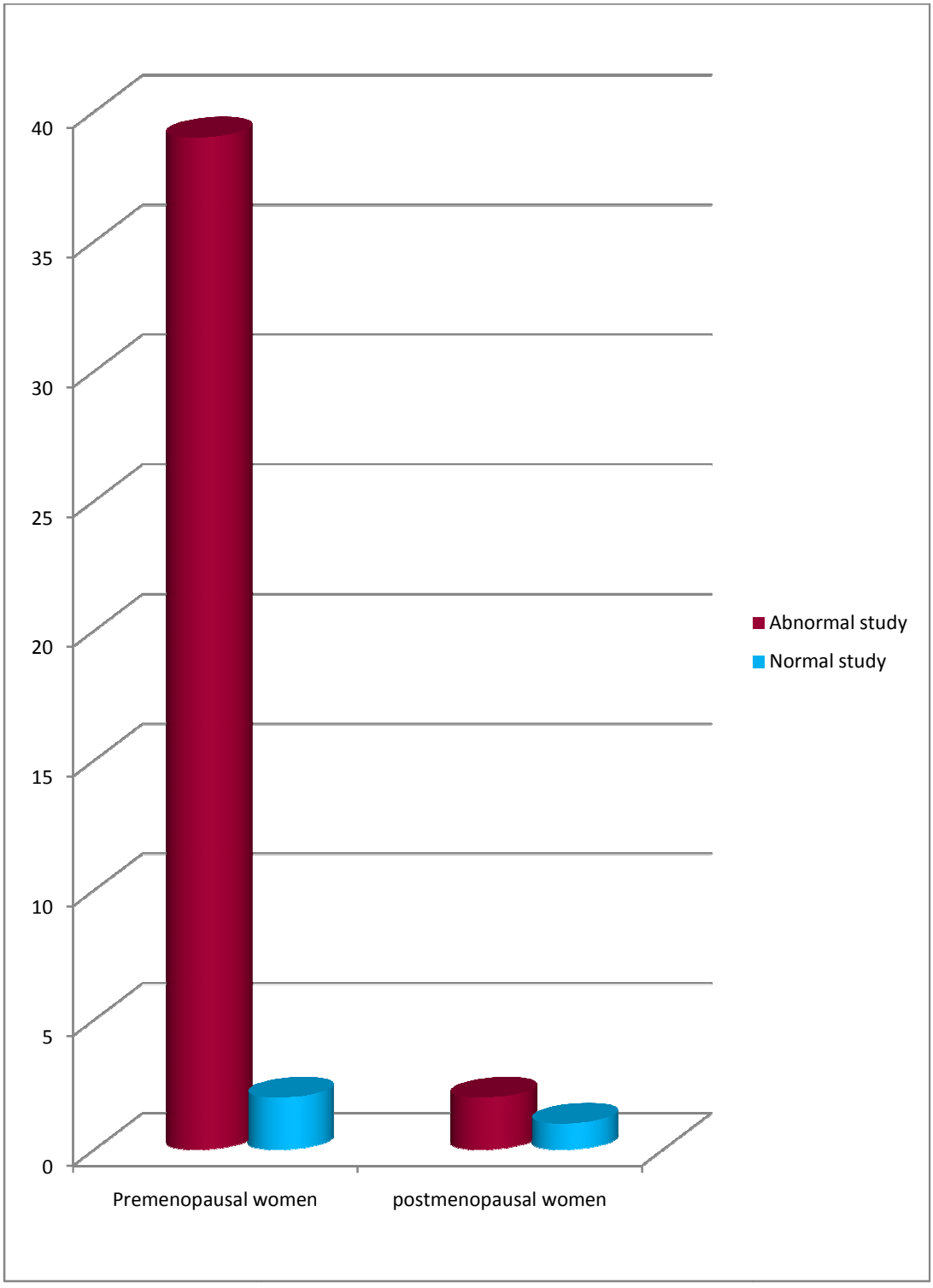
AGE GROUP(years)	MALES	FEMALES	TOTAL
18 – 25	12	25	37
26 - 35	7	4	11
36 – 45	2	2	4
46 – 55	-	2	2
56 – 65	-	-	-

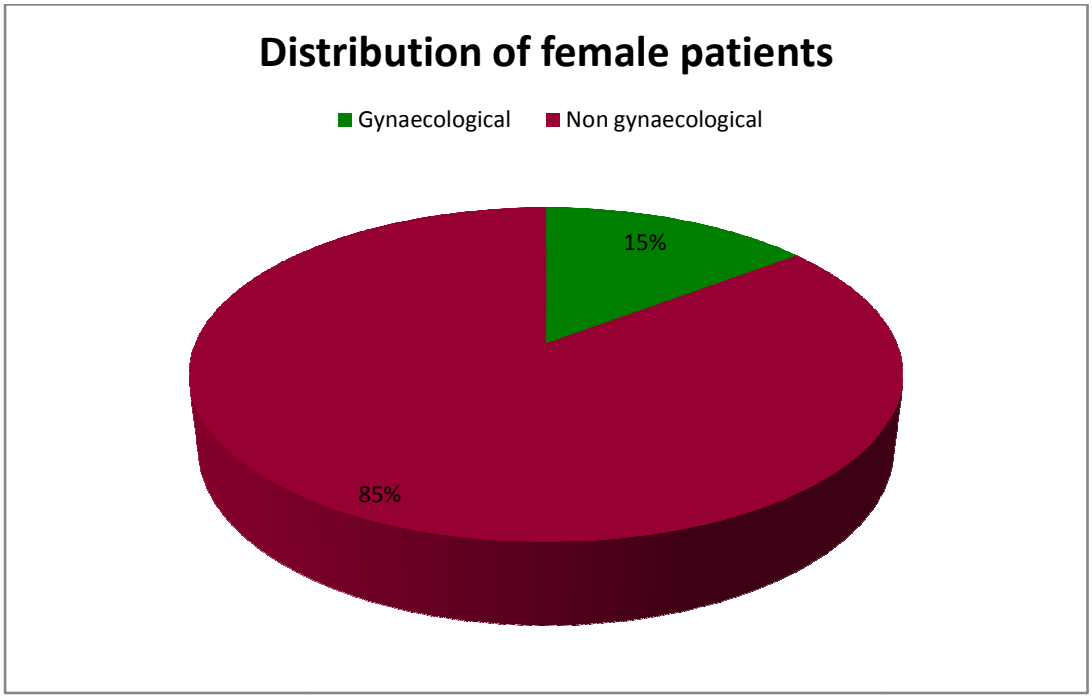


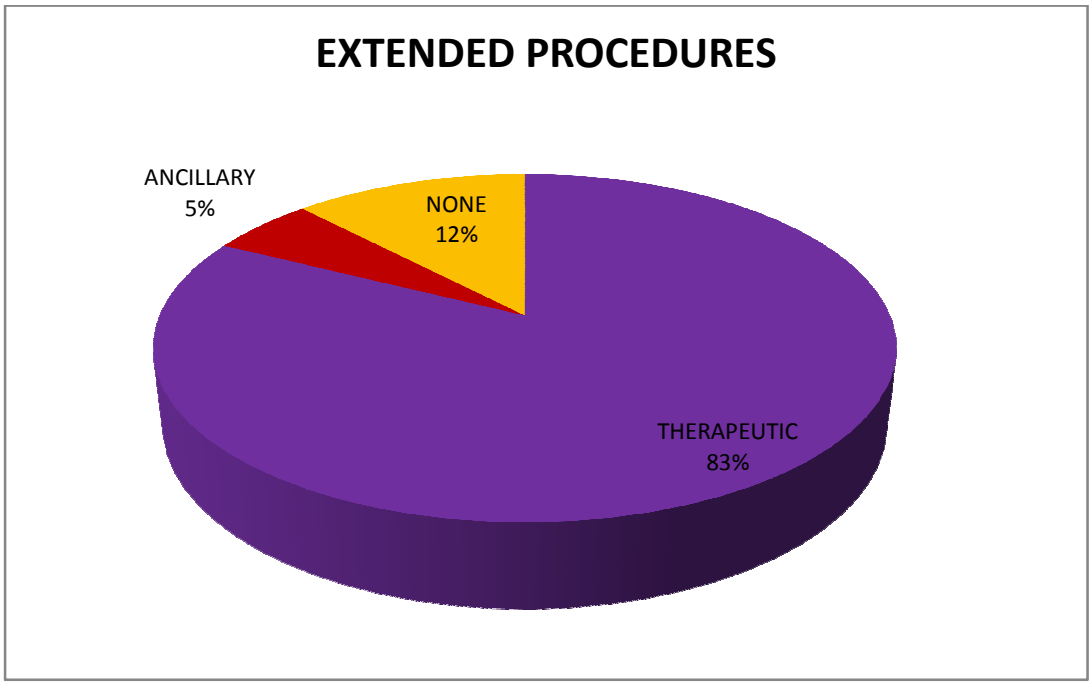
Conditions	Males	Females
Adhesions	1	4
Adhesions +Appendicitis	2	3
Adhesions + Right adnexal cyst	0	1
Adhesions + Mesenteric panniculitis	1	0

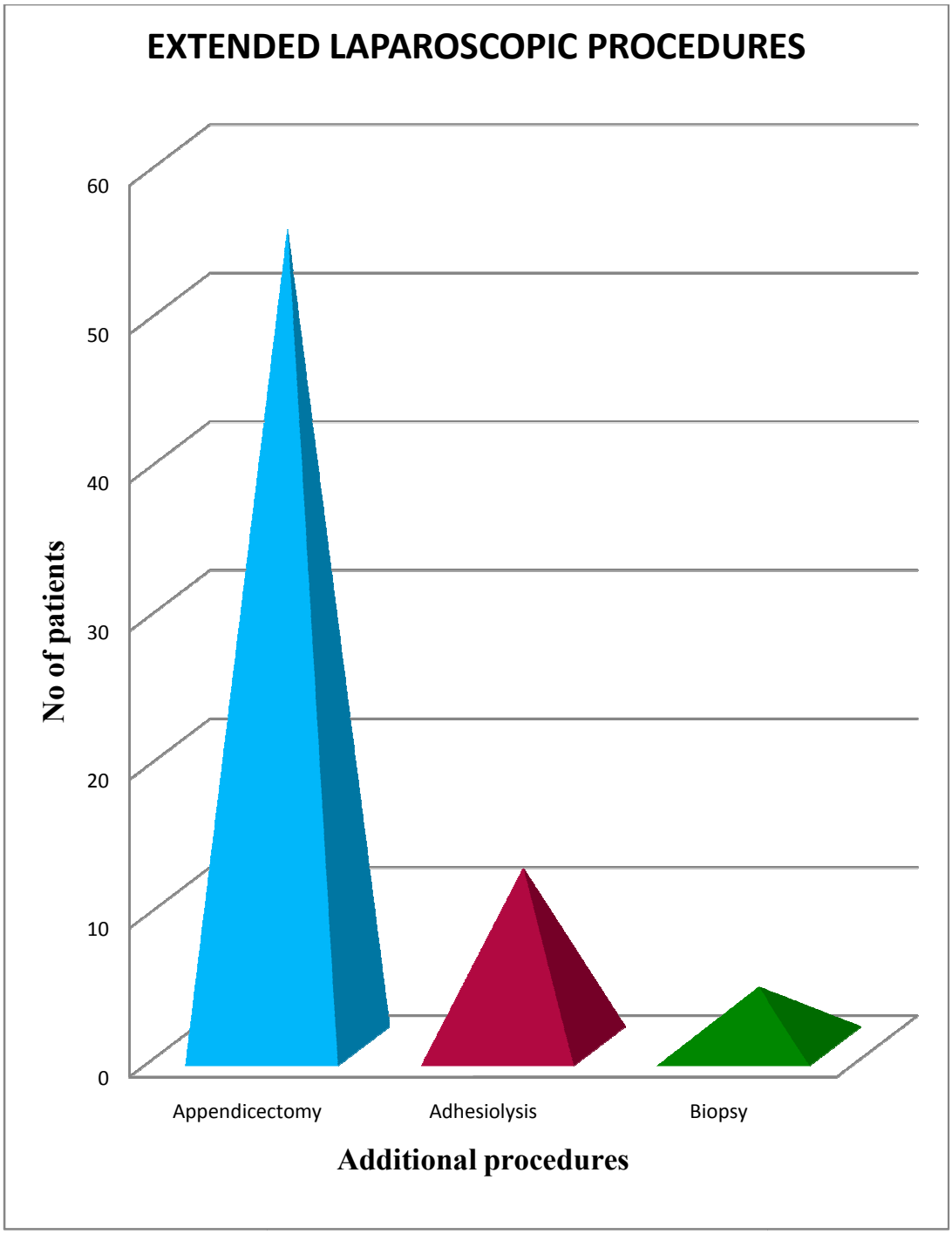


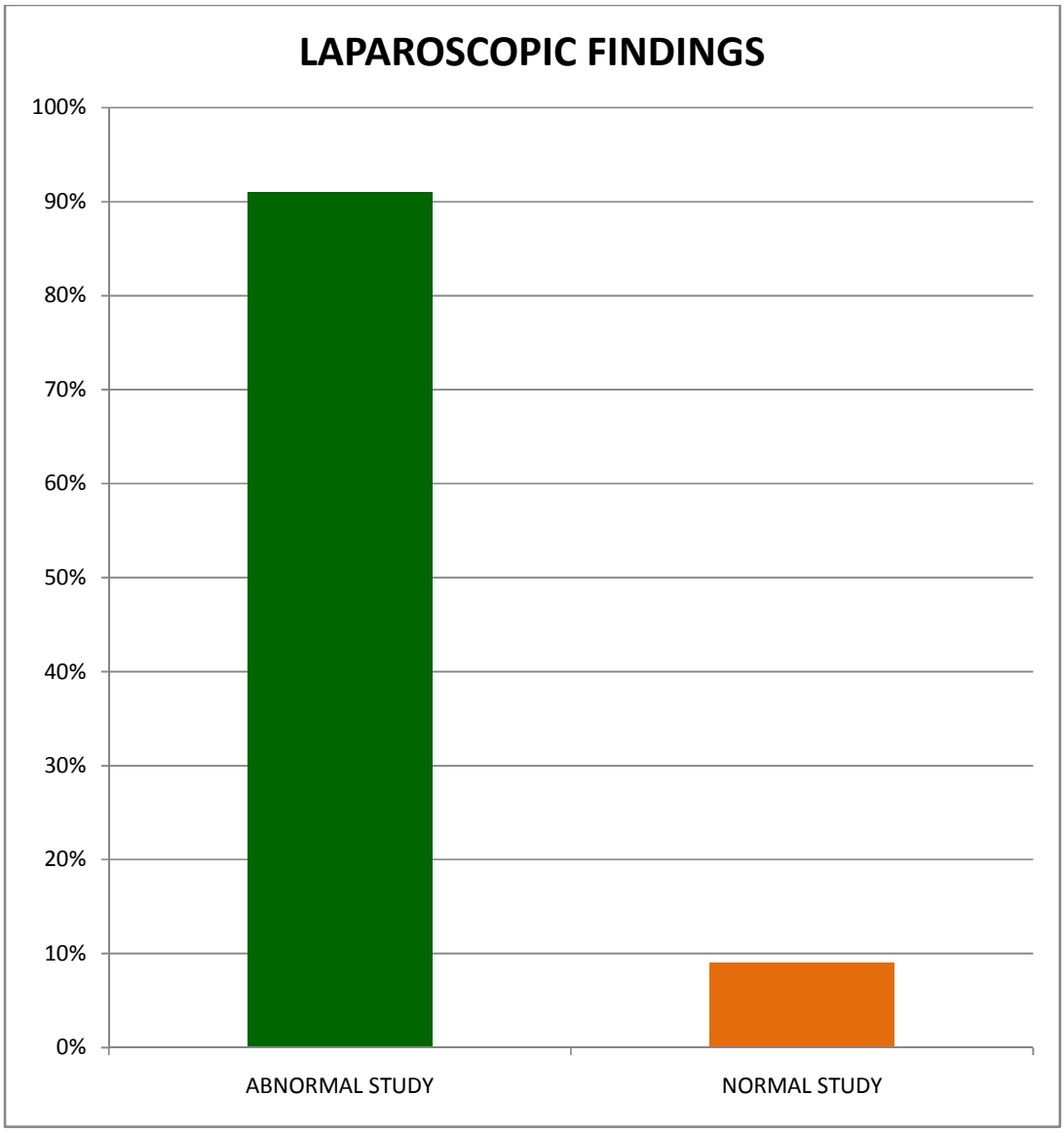

MESENTRIC LYMPHADENITIS
Mesentric lymphadenitis alone
Mesentric lymphadenitis + Appendicitis
33%
67%


40
35
30
25
20
15
10
5
0
Premenopausal women
postmenopausal women
Abnormal study
Normal study


Distribution of female patients
Gynaecological
Non gynaecological
15%
85%


EXTENDED PROCEDURES
ANCILLARY
5%
NONE
12%
THERAPEUTIC
83%


EXTENDED LAPAROSCOPIC PROCEDURES
60
50
40
30
20
10
0
No of patients
Appendicectomy
Adhesiolysis
Biopsy
Additional procedures


LAPAROSCOPIC FINDINGS
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
ABNORMAL STUDY
NORMAL STUDY

RESULTS

In this observational study “Diagnostic laparoscopy in the evaluation of right lower abdominal pain” 72 patients were analysed.

There were 28 males and 44 females. Lowest and highest age of the patients included was 18 and 63 years respectively.

Patients with right lower quadrant pain had associated symptoms like nausea, vomiting, fever, anorexia, burning micturition, leucorrhea and constipation. The most common associated symptom was vomiting which was found in 28 patients.

The abnormal findings that were shown by laparoscopy include appendicitis, adhesions, adnexitis, mesenteric lymphadenitis, meckel’s diverticulitis, mesenteric panniculitis, hydrosalpinx and right adnexal cyst

The operative findings of these patients were compared with the clinical diagnosis and any discrepancies noted, including the resultant change in management secondary to diagnostic laparoscopy.

The laparoscopic finding of appendicitis was found in 55 patients. Among which 84% of patients had appendicitis alone. The rest 16% of patients had other coexisting findings like adhesions, adnexitis and mesenteric lymphadenitis.

Out of patients with inflamed appendix, 32 were females. Among these 32 females, 24 patients were in the age group of 18 to 25.

12 patients had adhesions involving mesentery and bowel. 6 out of these 12 patients had associated findings like appendicitis, mesenteric panniculitis and adnexal cyst.

From the data analysed, it is clear that females (67%) were commonly affected by bowel adhesions.

Mesentric lymphadenitis was present in 3 patients with one of them having associated appendicitis.

Other rare laparoscopic findings shown by diagnostic laparoscopy include abdominal tuberculosis, mesenteric panniculitis and meckel's diverticulitis which together constituted less than 5% of the total cases.

Certain gynaecological findings were noted in diagnostic laparoscopy. It includes adnexitis, hydrosalpinx and right adnexal cyst. Among 44 females in the study, 3 females were post menopausal.

The data shows that 39 out of 41 premenopausal and 2 out of 3 postmenopausal females had an abnormal finding in diagnostic laparoscopy.

Among the females with an abnormal study only 15% were due to gynaecological pathologies. Majority of them had non gynaecological causes like appendicitis and adhesions.

There were 6 patients in whom diagnostic laparoscopy revealed normal study of the visualized organs.

In the study, it was noticed that 63 (87.5%) patients had an advantage of undergoing extended definitive therapeutic or ancillary procedure.

DISCUSSION

DISCUSSION

72 patients with right lower quadrant pain were studied during the period of October 2012 to November 2013. Females underwent diagnostic laparoscopy more commonly than males for right lower quadrant pain. The reason for increased incidence of right lower quadrant pain in females than males may be due to the additional gynaecological pathologies.

The most common age group affected was 18 to 25 years. This peak can be attributed to prevalence of appendicitis in this age group which is the leading cause of right lower quadrant abdominal pain.

The commonest symptom associated with right lower quadrant pain was vomiting which was found in 38 percent of patients. This is mainly because appendicitis is the most frequent finding noticed and it is usually associated with vomiting.

The single predominant finding noted in laparoscopy which contributed to 75 percent of total findings is appendicitis. Interestingly, among patients with appendicitis, 16 percent had other concomitant pathologies found on laparoscopy, which included mainly adhesions and

gynaecological causes like inflamed fallopian tubes. These are possibly due to surrounding inflammation caused by appendicitis.

Females are commonly affected by adhesions. This may be due to the fact that females commonly undergo lower abdominal surgeries like caesarian section and sterilization.

Females with RLQ pain were found to have more number of non gynaecological findings (85 percent) than gynaecological ones.

9 percent of the patients showed normal study of the visualized organs.

88 percent of the patients with RLQ pain had a benefit of undergoing extended therapeutic and ancillary procedures. The most common procedure done was laparoscopic appendicectomy. Other procedures include laparoscopic adhesiolysis and biopsy for mesenteric lymphadenitis and ileocaecal tuberculosis.

CONCLUSION

CONCLUSION

In this observational study, we have tried to understand the essentials of laparoscopy and its role in the evaluation of right lower abdominal pain over a period of one year and two months in 72 patients whose other routine investigations like laboratory tests and ultrasonogram abdomen were inconclusive.

- Laparoscopy provided its diagnostic benefit in ninety one percent of patients, who presented with right lower abdominal pain.

- Laparoscopy yielded its maximum diagnostic gain in women of child bearing age group. In these patients, the exposure to radiation by subjecting them to unnecessary radiological investigation is minimized.

- It had therapeutic role in eighty three percent of the patients with RLQ pain.

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MASTER CHART

MASTER CHART

S. No	Patient name	Age	Sex	IP No	Date of Surgery	Associated symptoms	Preop clinical diagnosis	Ultrasonogram report	Findings in diagnostic laparoscopy	Procedures Therapeutic / Ancillary
1	Suguna	30	F	25222	10.09.12	Vomiting	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
2	Meena	33	F	26254	12.09.12	Nil	Acute appendicitis	Probe tenderness in RIF	NS	Nil
3	Vignesh	18	M	27268	18.09.12	Vomiting,low grade fever	Acute appendicitis	NS	Mesenteric panniculitis + adhesions	Laparoscopic adhesiolysis + Biopsy of omental mass
4	Rajesh	23	M	27312	18.09.12	Nausea	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
5	Saroja	22	F	27576	21.09.12	Leucorrhea	PID	NS	Appendicitis	Laparoscopic appendicectomy
6	Raffiq	25	M	27981	01.10.12	Fever, burning micturition	UTI	Minimal free fluid in RIF	Appendicitis	Laparoscopic appendicectomy
7	Meenakshi	55	F	28276	03.10.12	Vomiting,low grade fever	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy

8	Arokiamary	37	F	28320	08.10.12	Nil	Acute appendicitis	Appendix not visualized, otherwise NS	Appendicitis + Adhesions	Laparoscopic appendicectomy + Adhesiolysis
9	Malar	36	F	29730	15.10.12	Vomiting	Acute appendicitis	NS	Adhesions	Laparoscopic adhesiolysis
10	Selvi	18	F	29470	15.10.12	Nausea,low grade fever	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
11	Vimala	32	F	30124	19.10.12	Leucorrhea, burning micturition	PID with UTI	Free fluid in the pelvis	Adhesions	Laparoscopic adhesiolysis

12	Vinoth	19	M	31564	22.10.13	Nil	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
13	Mukunthan	22	M	32031	05.11.12	Vomiting	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
14	Divya	19	F	32107	05.11.12	Fever with chills, burning micturition	UTI	PT in RIF,otherwise NS	Hydrosalpinx	Nil
15	Mary	24	F	33178	09.11.12	Fever,burning micturition	UTI	Caecal wall thickening	Appendicitis	Laparoscopic appendicectomy
16	Lokesh	32	M	33876	09.11.12	Nil	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
17	Gunasekaran	22	M	34048	24.11.12	Nausea, vomiting	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
18	Samundeshwari	32	F	34353	27.11.12	Vomiting, fever	Acute appendicitis	Dilated bowel loops,appendix not visualized	Meckels diverticulitis	Nil
19	Thilaga	19	F	37363	05.01.13	Leucorrhea, fever	PID	Free fluid in the pelvis	Appendicitis	Laparoscopic appendicectomy
20	Shanthi	33	F	31339	07.01.13	Vomiting,Dysmenorrhea	PID	Enlarged right ovary	Right adnexal cyst	Laparoscopic adhesiolysis

									+Adhesions	
21	Divya Ganga	19	F	130058 6	09.01.1 3	Nil	Acute appendicitis	PT in RIF,enlarged mesenteric nodes	Appendicitis	Laparoscopic appendicectomy
22	Dhana lakshmi	52	F	130017 0	21.01.1 3	Low grade fever	Acute appendicitis	NS	Appendicitis + Adhesions	Laparoscopic appendicectomy + Adhesiolysis
23	Balamurugan	24	M	130168 4	21.01.1 3	Nausea	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
24	Hariharan	18	M	130170 2	30.01.1 3	Fever	Acute appendicitis	NS	Mesenteric lymphadenitis	Biopsy
25	Sangeetha	25	F	130171 3	04.02.1 3	Nil	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
26	Jayalakshmi	63	F	130301 0	11.02.1 3	Vomiting,	Acute appendicitis	NS	NS	Nil

27	Akesh	40	M	1303254	11.02.13	Vomiting, burning micturition	UTI	NS	Appendicitis	Laparoscopic appendicectom
28	Babu	39	M	1303677	20.02.13	Vomiting	Acute appendicitis	PT in RIF,otherwise NS	NS	Nil
29	Suresh	18	M	1304110	20.02.13	Nil	Acute appendicitis	Minimal free fluid in RIF	Appendicitis	Laparoscopic appendicectom
30	Vaishali	18	F	1304433	21.02.13	Nausea	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectom
31	Murugan	23	M	1304526	26.02.13	Fever, constipation	Appendicitis	NS	Appendicitis	Laparoscopic appendicectom
32	Dharshini	38	F	1305534	02.03.13	leucorrhea	PID	Minimal free fluid in RIF	Adhesions	Laparoscopic adhesiolysis
33	Venkatesan	28	M	1306207	06.03.13	Vomiting, low grade fever	Acute appendicitis	PT in RIF,Appendix not visualized	Appendicitis + mesenteric lymphadenitis	Laparoscopic appendicectomy Biopsy of lymph node
34	Adhisha	30	F	1306213	11.03.13	Vomiting, abdominal distention	Adhesive colic	NS	Adhesions	Laparoscopic adhesiolysis
35	Gokul	19	M	1306977	16.03.13	Nil	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectom

36	Ranjith kumar	34	M	1307247	20.03.13	Nil	Acute appendicitis	Appendix not visualized	Appendicitis	Laparoscopic appendicectom
37	Abirami	29	F	1308395	03.04.13	Nausea	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectom
38	Aasha	24	F	1309843	10.04.13	Leucorrhea	PID	NS	Adnexitis	Nil
39	Gowri	18	F	1310852	22.04.13	Vomiting	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectom
40	Mani	46	M	1310567	22.04.13	Vomiting, Fever,Loose stools	Ileitis	Caecal wall thickening	Mesenteric lymphadenitis	Nil

41	Eshwari	26	F	1313951	18.05.13	Nil	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
42	Ezhilarasi	20	F	1313641	25.05.13	Nil	Acute appendicitis	NS	Appendicitis + Fibrosed right fallopian tube	Laparoscopic appendicectomy
43	Senthamizh	20	M	1314019	25.05.13	Low grade fever	Acute appendicitis	NS	Appendicitis + Adhesions	Laparoscopic appendicectomy + Adhesiolysis
44	Kalpana	23	F	1315527	01.06.13	Nausea	Acute appendicitis		Appendicitis	Laparoscopic appendicectomy
45	Subash	25	M	1315574	03.06.13	Constipation	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
46	Nirmala	42	F	1316257	08.06.13	Nausea, vomiting	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
47	Abirami	25	F	1316321	12.06.13	Anorexia, vomiting	Acute appendicitis	Minimal free fluid in RIF	Appendicitis + Adnexitis	Laparoscopic appendicectomy
48	Rayar	53	M	1316286	15.06.13	Vomiting, low grade fever	Acute appendicitis	Inflammed caecum	Tubercles over terminal ileum and peritoneum	Biopsy
49	Lakshmi	19	F	1317423	22.06.13	Nil	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
50	Fathima	23	F	1317401	24.06.13	Burning micturition	UTI	Free fluid in pelvis	Appendicitis	Laparoscopic appendicectomy

51	Ramya	30	F	1317983	24.06.13	Vomiting	Acute appendicitis	NS	Adhesions	Laparoscopic adhesiolysis
52	Venkatesan	28	M	1318434	03.07.13	Nausea	Acute appendicitis	NS	Appendicitis + Adhesions	Laparoscopic appendicectomy+ Adhesiolysis
53	Vaishnavi	18	F	1319141	08.07.13	Fever, Leucorrhea	PID	appendix not visualized	Appendicitis	Laparoscopic appendicectomy
54	Dinesh	18	M	1319159	08.07.13	Increased frequency of defaecation	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
55	Kaviyarasi	19	F	1319947	10.07.13	Nil	Acute appendicitis	NS	Appendicitis + Adnexitis	Laparoscopic appendicectomy
56	Senthil	29	M	1319952	10.07.13	Vomiting fever	Acute appendicitis	Minimal free fluid in RIF	NS	Nil
57	Antony	28	M	1319654	13.07.13	Vomiting	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
58	Malar	19	F	1320354	16.07.13	Vomiting	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
59	Saranya	21	F	1320635	24.07.13	Vomiting	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
60	Manikandan	20	M	1322488	06.08.13	Nausea	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy

61	Josephine	18	F	1324583	26.08.13	Burning micturition, fever	UTI	NS	Appendicitis	Laparoscopic appendicectomy
62	Premakumari	22	F	1328011	28.09.13	Vomiting	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
63	Usha	24	F	1328244	07.10.13	Leucorrhea	Pelvic inflammatory disease	Minimal free fluid in RIF, Appendix not visualized	Appendicitis + Adnexitis	Laparoscopic appendicectomy
64	Sundara Moorthi	33	M	1329375	09.10.13	Nil	Acute appendicitis	PT in RIF, otherwise NS	Appendicitis	Laparoscopic appendicectomy
65	Harikrishnan	42	M	1327315	12.10.13	Nausea	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
66	Pushpa	20	F	1330011	14.10.13	Fever with chills, Burning micturition	UTI	PT in RIF, Appendix not visualized	Appendicitis	Laparoscopic appendicectomy
67	Shanthi	36	F	1328883	14.10.13	Nausea	Acute appendicitis	NS	NS	Nil
68	Kala	25	F	1331332	19.10.13	Vomiting, Fever	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
69	Lavanya	21	F	1330154	21.10.13	Leucorrhea dysmenorrhe	PID	Minimal free fluid in pelvis	Appendicitis	Laparoscopic appendicectomy

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70	Senthil kumar	27	M	1331001	26.10.13	Vomiting	Acute appendicitis	NS	Appendicitis	Laparoscopic appendicectomy
71	Mangamma	31	F	1333036	06.11.13	Vomiting	Acute appendicitis	NS	Appendicitis + Adhesions	Laparoscopic appendicectomy + Adhesiolysis
72	Kanisha	20	F	1335684	30.11.13	Fever with chills, burning micturition, vomiting	UTI	Mesenteric lymphadenitis	Appendicitis	Laparoscopic appendicectomy

ABBREVIATIONS

RLQ – Right Lower Quadrant

PID – Pelvic Inflammatory Disease

RIF – Right Iliac Fossa

NS – Normal Study

PT – Probe Tenderness

UTI – Urinary Tract Infection